DEPARTMENT OF COMMERCE
BUREAU OF FISHERIES
HENRY O'MALLEY, Commissioner

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1922

By WARD T. BOWER
Field Assistant

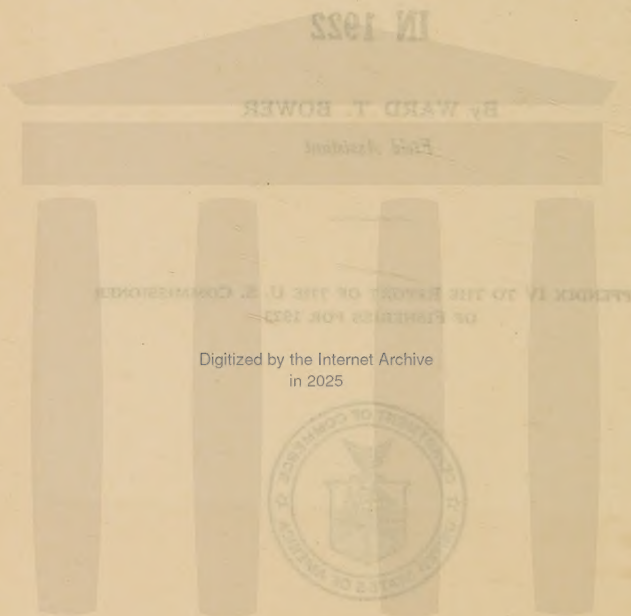
APPENDIX IV TO THE REPORT OF THE U. S. COMMISSIONER OF FISHERIES FOR 1923

Bureau of Fisheries Document No. 951

PRICE 20 CENTS
Sold only by the Superintendent of Documents, Government Printing Office
Washington, D. C.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1923

Digitized by the Internet Archive
in 2025



https://archive.org/details/report-of-the-united-states-commissioner-of-fisheries_1923_appendix-4

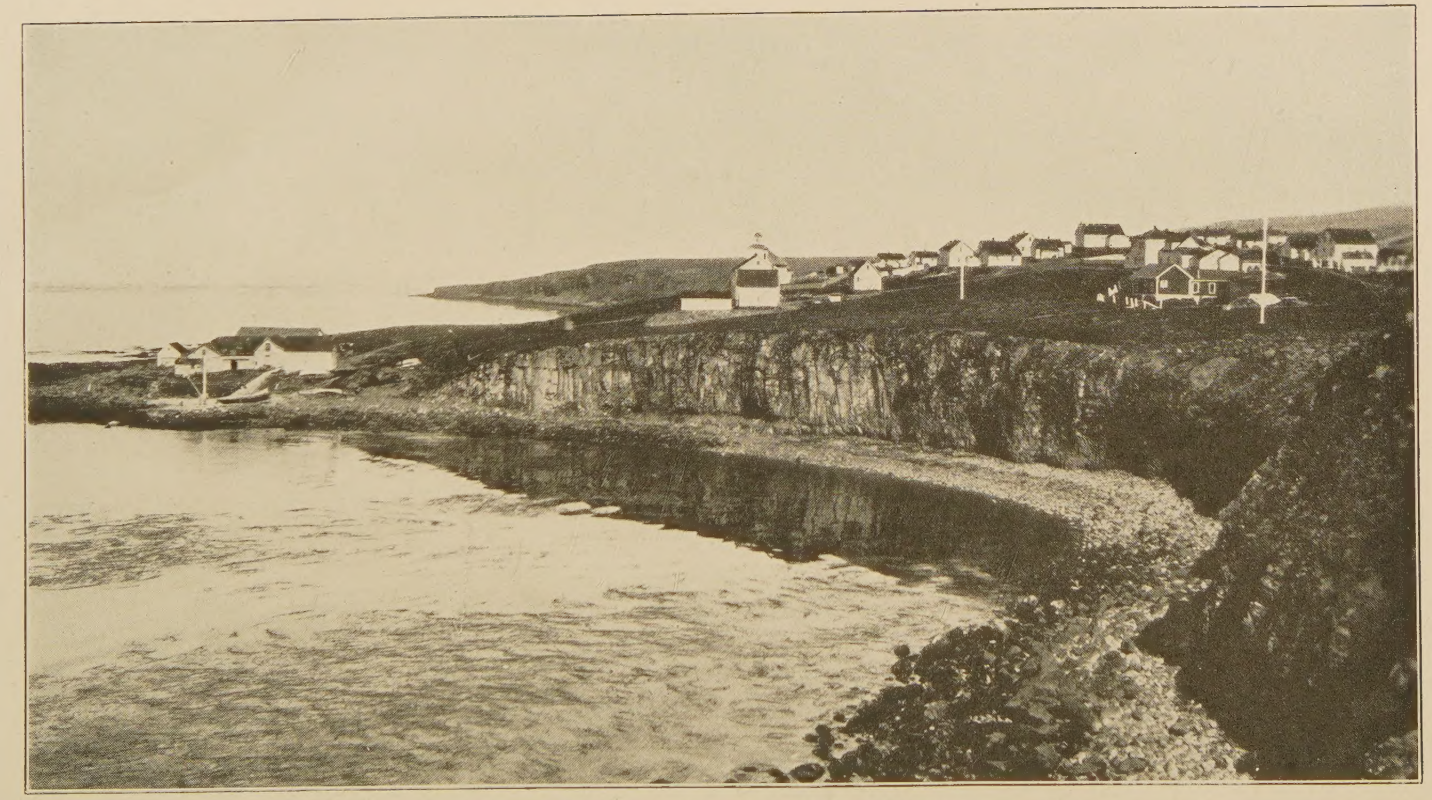


FIG. 1.—St. George landing and village, Pribilof Islands.

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1922.[1]

By WARD T. BOWER, *Field Assistant.*

CONTENTS.

	Page.
INTRODUCTION	2
Special investigation by Assistant Secretary of Commerce and party	3
Regular employees, Alaska service	6
FISHERY INDUSTRIES	8
Waters closed to commercial fishing	8
Alaska Peninsula Fisheries Reservation	8
Southwestern Alaska Fisheries Reservation	11
Afognak Reservation	14
Aleutian Islands Reservation	15
Annette Island Fishery Reserve	16
Stream markers	16
Stream guards	17
Fishery patrol	18
Alaska fishery intelligence service	18
Violations of the fisheries laws and regulations	19
Territorial license tax	21
Water-power projects in Alaska	21
Tagging of salmon	24
Salmon for fox food	24
Bristol Bay district	25
General report of season's operations	25
Destruction of predatory fishes and birds	26
Extent of salmon runs	31
Patrol	32
Spawning grounds	33
Wood River lake system	35
General report of season's operations	35
Predatory fish and birds	39
Fishing on spawning grounds	41
Action of ice on salmon eggs	41
Conclusion	41
Lake Aleknagik investigations	41
Notes on explorations of Lake Aleknagik, Alaska, its tributaries, and the salmon spawning grounds, in 1908 and 1909	42
The large escapement of 1908	50
Kuskokwim River	50
Markers	53
Runs of salmon	54
Natural enemies	54
General description of the Kuskokwim	55
Chignik salmon counts	56
Karluk salmon counts	57
Yukon River fishery	57
Hatcheries	58
Extent of operations	58
Hatchery rebates	59
Hatchery operations	59
McDonald Lake	59
Afognak	59
Fortmann	59
Quadra	60
Territorial hatcheries	60
Egg collections by Washington State fishery authorities	60
General statistics of the fisheries	61
Salmon industry	62
Salmon catch and apparatus	63
Salmon canning	64
Changes in canneries	64
New canneries	65
Canneries not operated	65
Total canneries operated	66
Losses and disasters	68
Statistics	68
Mild curing of salmon	72
Salmon pickling	72
FISHERY INDUSTRIES—Continued.	Page.
Salmon industry—Continued.	
Salmon freezing	73
Fresh salmon	74
Drying and smoking of salmon	74
Salmon by-products	75
Herring fishery	75
Statistical summary	75
Halibut fishery	76
Statistical summary	76
Cod fishery	77
Statistical summary	77
Whale fishery	78
Clams	78
Shrimps	79
Crabs	79
Trout	79
Miscellaneous fishery products	79
FUR-SEAL INDUSTRY	80
Pribilof Islands	80
General administrative work	80
Official visit by Assistant Secretary of Commerce	80
Personnel	81
Purchase and transportation of supplies	81
Power schooner Eider	82
Construction work	82
Well-drilling	83
By-products plant	84
Natives	84
Census	84
Health conditions	85
Dental work	85
Schools	85
Attendance at Salem Indian Training School, Chemawa, Oreg	86
Savings accounts	86
Payments for taking sealskins	87
Payments for taking fox skins	88
Fur-seal herd	88
Quota for killing	88
Killings of seals	89
Age classes of seals	91
Branded seals	91
Washing and blubbering sealskins	91
Census	92
Charting of harem areas	93
Photographs of seal rookeries	93
Specimen seals	93
Foxes	94
Fox-trapping season of 1922–23	94
Sale of blue foxes	94
Reindeer	94
Pribilof fur-seal skins	95
Shipments and sales	95
Disposition of sealskins	100
Pribilof fox skins	101
Shipments and sales	101
Fur-seal patrol by United States Coast Guard	102
Sealing privileges accorded aborigines	109
Japanese sealskins delivered to the United States	110
FUR-SEAL CENSUS, PRIBILOF ISLANDS, 1922	111
Pups	111
Cows	114
Branded seals	114
Harem and idle bulls	114
Average harem	115
Annual increase of the fur-seal herd	116
Complete census	116

[1] Appendix IV to the Report of the U. S. Commissioner of Fisheries for 1923. B. F. Doc. 951.

INTRODUCTION.

The bureau's work in Alaska was conducted along much the usual lines in the calendar year 1922, the chief change being the adoption of the policy of establishing reservations in districts that were threatened with overfishing and the licensing of operators under restrictions on output and apparatus. Two reservations were created, the Alaska Peninsula Fisheries Reservation by Executive order of February 17, 1922, and the Southwestern Alaska Fisheries Reservation by Executive order of November 3, 1922. Special regulations governing fishing operations in the Alaska Peninsula Fisheries Reservation were in effect during the fishing season of 1922.

A considerably increased force of temporary stream guards worked under the direction of the bureau's permanent employees during the active fishing season. Three patrol boats were added to the bureau's fleet and were made use of for the first time this season. A larger number of small boats was also chartered during the season.

An expedition was again sent into the Bristol Bay region, which during the early part of the season gave attention to the destruction of predatory fishes and birds and during commercial fishing activities maintained a patrol for the enforcement of the fishery laws and regulations. Two members of the party remained in the district during the winter of 1922–23 to make an examination of spawning beds and secure information as to the size of the escapement of spawning salmon.

A count of spawning salmon ascending the Karluk River was again made, and similar operations were undertaken at Chignik River, where a rack was constructed a short distance above Chignik Lagoon. A special study of fishery conditions on the Kuskokwim River was made.

The bureau cooperated with the Federal Power Commission in connection with applications for licenses for power projects in Alaska. Inquiries were made regarding the use of salmon for fox food on the numerous fur farms in Alaska.

In connection with studies by Dr. C. H. Gilbert of the life history of the Pacific salmons, and particularly the determination of migration routes, important work was inaugurated by the tagging of salmon taken from traps along the Alaska Peninsula and at the Shumagin Islands and by the collection of data on the time and place of recapture.

No change was made in the regulations for the protection of walruses and sea lions.

Transportation of Government employees and supplies for the Pribilof Islands was chiefly by commercial vessels, although valuable assistance along these lines was rendered by Coast Guard and naval vessels in a number of instances.

Operations in connection with the fur-seal and blue-fox industries and the administration of the affairs of the natives on the Pribilof Islands were carried on in a manner similar to previous years. The improved methods of taking skins and the removal of blubber at the islands was extended in operations on St. Paul Island. The total take of sealskins in the calendar year 1922 was 31,156; and 888 blue

and 29 white fox skins were taken in the trapping season of 1922–23, in addition to which 12 live foxes for breeding purposes were sold to fox farmers in Alaska.

Two sales at public auction of sealskins taken on the Pribilof Islands were held at St. Louis in 1922 by the selling agents of the department. The fox skins taken in the preceding season were also disposed of at one of these sales.

Acknowledgment is made of the assistance rendered by Assistant Agent Edward M. Ball in the compilation of statistics and text in the fisheries section of this report and by H. D. Aller and Edward C. Johnston in the preparation of data regarding the fur-seal and fox industries of the Pribilof Islands.

A special party headed by the Assistant Secretary of Commerce, and of which the author of this report was a member, made an extensive trip for the study of conditions of the fisheries and fur seals of Alaska, also the seal herds of Russia and Japan, and returned by way of Asia and Europe. The latter part of the trip was more particularly devoted to trade promotion and a study of economic conditions in the various countries visited.

SPECIAL INVESTIGATIONS BY ASSISTANT SECRETARY OF COMMERCE AND PARTY.

With a view to making certain essential inquiries regarding the fisheries of Alaska and the fur-seal industry of the north Pacific, also to devote attention to other important governmental matters, a party sailed from Seattle June 20, 1922, on the Coast Guard cutter *Mojave*, which had been specially detailed for this purpose. The party was headed by C. H. Huston, Assistant Secretary of Commerce, other members officially attached being Dr. Leonhard Stejneger, of the United States National Museum; Dr. Alfred H. Brooks, United States Geological Survey; Lieut. Col. H. M. Evans, United States Public Health Service; Lieut. John M. Creighton, United States Navy; Ward T. Bower, Bureau of Fisheries; D. J. Davis, Department of Labor; and J. L. Baker and C. E. Lindquist, special assistants. Col. James G. Steese, president of the Alaska Road Commission, joined the party at Juneau and continued as far as Petropaulski, Siberia. In Alaska the more important places visited were Ketchikan, Yes Bay, Wrangell, Petersburg, Juneau, Cordova, Seward, Karluk, Chignik, False Pass, Akutan, Unalaska, the Pribilof Islands, and Nome. En route from Seattle a brief stop was also made at Prince Rupert, British Columbia. At Cordova the party left the *Mojave* and proceeded by railroad and automobile to Fairbanks, thence by Government railway to Anchorage and Seward, where the *Mojave* was rejoined.

Consideration was given to important fishery questions in the Territory, particularly in regard to measures for perpetuating the supply of salmon so seriously threatened in a number of places. The Government hatchery at Yes Bay was visited, as was also the Territorial hatchery at Juneau. Important conferences were had with the Governor of Alaska and other officials. Note was made of the salmon-counting experiments conducted at Karluk. Important action was taken in regard to administering the fisheries of the Alaska Peninsula Fisheries Reservation.

On July 10 Mr. Huston, accompanied by Dr. Stejneger and Messrs. Bower, Baker, and Lindquist, left the *Mojave* and proceeded to the Pribilof Islands on the Coast Guard cutter *Algonquin*, arriving at St. Paul Island July 12, having stopped for a few hours en route at St. George Island. Doctor Stejneger and Captain Lindquist left the Pribilofs shortly thereafter on that vessel for the Commander Islands via Unalaska for a special investigation of the Russian fur-seal herd. Mr. Huston made a thorough investigation of the condition of the fur-seal herd at the Pribilof Islands and observed administrative methods and various features of the work. Attention was devoted especially to the improved manner of taking sealskins by stripping the pelts from the animals instead of the old laborious skinning by hand. The journey was resumed on the *Mojave* July 19, arriving at Nome July 21.

Thereafter visits were paid to Emma Harbor and Anadir, Siberia, where salmon fishery conditions were noted. Although the river at Anadir is large, it does not carry a particularly heavy run of salmon. No canneries were found in that region, and fishing operations were limited to two salteries, the product being destined for Japanese markets.

The *Mojave* returned from Anadir to Dutch Harbor, Alaska, for fuel, sailing from that place August 2 and arriving at Bering Island of the Commander group on August 8, where a brief visit ashore was made and Doctor Stejneger and Captain Lindquist were taken aboard. The condition of the fur-seal herd of the Commander Islands is not good; the lack of stable government has proved unfortunate in respect to the protection and conservation of the Russian seal herd. Representatives of the Government at Vladivostok were in charge, but their authority was more or less in doubt and they did not know what developments might be brought forth from day to day. Inasmuch as this condition has resulted in lack of supplies for the natives, it is only natural that they should engage in the occasional surreptitious disposal of fur-seal and fox skins. From time to time Japanese cruisers have visited the waters, and it is said that the natives traded skins for supplies. It was understood that in 1922 about 600 fur seals would be taken at the Commander Islands, chiefly for food for the native inhabitants.

There has been some seal poaching by Japanese schooners around the Commander Islands; in fact, the crew of a Japanese vessel was captured by native guards at Copper Island and was confined in jail at the time the *Mojave* was in Petropaulski. Subsequent inquiries at Tokyo developed the fact that officials of the Japanese Government regard this poaching as wholly improper and indefensible.

The Russian fur-seal herd has declined to probably not over 18,000 animals. This matter will be made the subject of a special report by Doctor Stejneger, who had visited the Commander Islands previously in 1882, 1883, 1895, 1896, and 1897. The department considered itself fortunate in securing the services of Doctor Stejneger for this important investigation.

From August 9 to 11 the *Mojave* was at Petropaulski on the Kamchatka Peninsula, where inquiries were made regarding fishery and fur-trade conditions. This is the principal port on the Kamchatkan coast and is the base of salmon fishery operations conducted at four

canneries in that region. The Kamchatka River, about 100 miles north of Petropaulski, is the only stream of real importance on the eastern coast of Kamchatka. It has a fairly good run of red salmon.

On the west coast of Kamchatka the Ozernaya River has a good run of red salmon and is fished by several canneries. The lack of harbors makes operations precarious. The products are marketed largely in Japan and England. Fishery operations are chiefly controlled by Japanese capital. Several Japanese cruisers were observed in this region, their presence being primarily to afford protection to Japanese fishing interests.

From Petropaulski the *Mojave* proceeded to Robben Island, arriving August 15. Representatives of the Japanese Government who had been especially sent there for the occasion extended a cordial welcome. A careful examination of the rookeries revealed them to be in splendid condition. The Japanese Government is handling Robben Island very successfully. Doctor Stejneger visited this island in 1896 and was much surprised to note the great increase of the herd in 1922. This island is small, not over one-half mile in length, and the number of fur seals is necessarily correspondingly limited. Doctor Stejneger's preliminary estimate, however, was that the herd now numbers upward of 20,000 animals, a very remarkable increase. The take of skins in 1922 numbered 600. The results of observations here will be covered in a special report.

After leaving Robben Island August 16 the *Mojave* made calls at Otomari, Otaru, and Hakodate and reached Yokohama August 26. Members of the party visited Tokyo for conferences with Japanese officials and went also to the Marine Biological Laboratory at Misaki. Messrs. Stejneger, Brooks, and Lindquist returned to the States by commercial steamer from Yokohama. Dr. James F. Abbott, commercial attaché at Tokyo, joined the party and remained with it until arrival at Shanghai. Some of the members of the party proceeded to Kyoto and Osaka, rejoining the *Mojave* at Kobe. After leaving the latter port a call was made at Itozaki, and Vladivostok was reached September 6, where consideration was given to fishery matters affecting the Siberian coast. The party left Vladivostok September 9 and arrived the following day at Fusan, Korea. From this point Mr. Huston and Doctor Abbott proceeded by train to Seoul, Mukden, Peking, and Shanghai. The *Mojave* reached Shanghai September 14 and remained nine days. The next port of call was Manila, which was reached September 27. Lieutenant Creighton left at this point and returned to the States.

At Manila the *Mojave* was dispensed with. Approximately 103 days were spent aboard the vessel and about 12,000 miles were cruised. This was the first extended voyage of the *Mojave*, one of the new electric-driven Coast Guard cutters built in the fall of 1921. The results speak very highly for the ship and for the efficiency of Lieut. Commander H. G. Hamlet, commanding the vessel, and the officers and crew. Acknowledgment is hereby made of the splendid cooperation and numerous courtesies freely extended by the officers and crew of the *Mojave*.

From Manila the party, which now consisted of Assistant Secretary Huston and Messrs. Evans, Bower, Baker, and Davis, proceeded by commercial steamer to Hongkong. A trip was also made to Canton. October 10 the party left Hongkong for Singapore, which

was reached five days later. Other points thereafter visited included Penang, Calcutta, Bombay, Aden, Port Said, and Cairo. Marseilles was reached November 25. From that point visits were made to Monte Carlo, Rome, Milan, Zurich, Vienna, Prague, Berlin, Brussels, Paris, The Hague, and London. Departure from Southampton occurred December 14, and New York was reached December 23.

After leaving Japan attention was chiefly devoted to a study of economic conditions and possibilities of trade promotion through the countries of Asia and Europe. Attention was also given to the activities of representatives of the Department of Commerce stationed in those countries.

In London visits were made to plants where fur-seal skins have been dressed and dyed, and special attention was given to conditions affecting the marketing of fur-seal skins. The conclusion was reached that there was nothing to warrant any change in the method of this Government in disposing of its fur-seal skins in the United States.

REGULAR EMPLOYEES, ALASKA SERVICE.

During the year 1922 the following regular employees were identified with the Alaska service of the bureau:

Regular employees identified with the Alaska service in 1922.

Name.	Position.	Headquarters or chief place of duty.
Ward T. Bower	Field assistant	Washington, D. C.
Dennis Winn	Chief agent	Seattle.
Edward M. Ball	Assistant agent	Juneau.
Harry J. Christoffers	do	Seattle.
Calvin F. Townsend	Inspector	Fairbanks.
Shirley A. Baker	Assistant agent	Cordova.
Lemuel G. Wingard	do	Bethel.
A. H. Proctor	Superintendent	St. Paul Island.
Charles E. Crompton	Agent and caretaker	St. George Island.
Henry D. Aller	do	St. Paul Island.
Edward C. Johnston	Storekeeper	Do.
Henry C. Scudder	do	St. George Island.
George B. Bowlby	Physician	St. Paul Island. (Resigned Oct. 9, 1922.)
William M. Murphy	do	St. George Island. (Resigned Aug. 11, 1922.)
George S. Lesher	do	St. George Island.
Robert E. Davis	do	St. Paul Island. (Appointed Oct. 10, 1922.)
Henry Mygatt	Assistant to agent	St. Paul Island. (Resigned Aug. 9, 1922.)
Paul E. Moran	do	St. Paul Island. (Appointed Aug. 10, 1922.)
Richard Culbertson	School-teacher	St. Paul Island. (Resigned July 31, 1922.)
Harold W. Lashier	do	St. Paul Island. (Appointed Aug. 18, 1922.)
John M. Orchard	do	St. George Island.
Edna C. Mygatt	do	St. Paul Island. (Resigned July 10, 1922.)
Lois L. Proctor	do	St. Paul Island. (Appointed Aug. 14, 1922.)
Michael J. O'Connor	Warden	Juneau.
Fred H. Gray	do	Wrangell.
James K. Nevill	do	Do.
Adolph T. Looff	do	Nushagak.
Joseph N. Braun	do	False Pass. (Resigned Sept. 12, 1922.)
William E. Baumann	do	Afognak.
Chauncey C. Combs	do	Haines. (Resigned Aug. 31, 1922.)
Charles Petry	do	Chignik.
Lawrence K. Smith	do	Seldovia. (Resigned Dec. 31, 1921.)
Arthur H. Mellick	Master power vessel Fider	Unalaska.
Jesse L. Nevill	Master patrol vessel Auklet	Wrangell.
George G. Naud	Master patrol vessel Murre	Juneau. (Resigned Aug. 31, 1922.)
Arthur McLean	do	Juneau. (Appointed Sept. 1, 1922.)
Earle L. Hunter	Master patrol vessel Widgeon	Juneau. (Appointed Aug. 1, 1922.)
C. E. Tibbits	Master patrol vessel Petrel	Do.
Hector McAlister	Master patrol boat Scoter	Nushagak. (Appointed May 1, 1922.)
Albert K. Brown	Clerk	Washington, D. C.
Mary S. Haines	do	Do.
Edna Bishop	do	Do.
E. Elaine Baker	do	Seattle. (Resigned Apr. 15, 1922.)
Gladys M. Gamlen	do	Seattle.
Beverly G. Rupp	do	Seattle. (Appointed Apr. 17, 1922.)

Regular employees at Government hatcheries in Alaska in 1922.

Location and name.	Position.
Afognak:	
Edwin Wentworth	Superintendent. (Resigned Sept. 21, 1922.)
Fred R. Lucas	Superintendent. (Promoted Aug. 21, 1922, from fish-culturist.)
Harry J. Heuver	Foreman. (Transferred Oct. 31, 1922, to Saratoga, Wyo.)
Frank L. Snipes	Foreman. (Transferred Nov. 1, 1922, from fish-culturist, Tupelo, Miss.)
Alfred Nelson	Fish-culturist.
Homer H. Whitford	Fish-culturist. (Transferred Aug. 1, 1922, from apprentice fish-culturist, Puget Sound stations; promoted Oct 16, 1922.)
Nicolai Boskofsky	Apprentice fish-culturist.
Ray S. Wood	Do.
Nicolai W. Anderson	Apprentice fish-culturist. (Appointed Feb. 1, 1922; appointment expired May 4, 1922.)
Carl A. Kjorsvick	Apprentice fish-culturist. (Appointed May 5, 1922; appointment expired Aug. 8, 1922.)
Russell Waterbury	Apprentice fish-culturist. (Appointment expired May 4, 1922.)
Robert E. Forsyth	Apprentice fish-culturist. (Appointed May 5, 1922.)
William Rossing	Cook.
McDonald Lake:	
C. H. Van Atta	Superintendent. (Transferred Sept. 21, 1922, to Leadville, Colo.)
John W. Gardner	Superintendent. (Promoted Sept. 22, 1922, from foreman, Puget Sound stations.)
Calvin D. Ryan	Foreman.
George L. Savage	Fish-culturist. (Dismissed Feb. 28, 1922.)
Melvin L. Soules	Fish-culturist. (Promoted Aug. 1, 1922, from apprentice fish-culturist.)
Arthur P. Swanberg	Fish-culturist. (Resigned Nov. 14, 1922.)
Frank W. Ross	Apprentice fish-culturist. (Resigned July 19, 1922.)
Gustavus W. Hanson	Apprentice fish-culturist. (Appointed Aug. 16, 1922.)
Herbert D. Rhodes	Apprentice fish-culturist. (Transferred Aug. 1, 1922, from apprentice fish-culturist, Cape Vincent, N. Y.)
Louis Flagstad	Apprentice fish-culturist. (Appointed Jan. 1, 1922; resigned Sept. 30, 1922.)
Joseph M. Lysnes	Apprentice fish-culturist. (Appointed Oct. 1, 1922.)
Sadie Ross	Cook. (Resigned July 19, 1922.)
Marie Flagstad	Cook. (Appointed Aug. 16, 1922.)

FISHERY INDUSTRIES.

As in corresponding reports for previous years, the Territory of Alaska is here considered in the three coastal geographic sections generally recognized, as follows: Southeast Alaska, embracing all that narrow strip of mainland and the numerous adjacent islands from Portland Canal northwestward to and including Yakutat Bay; central Alaska, the region on the Pacific from Yakutat Bay westward, including Prince William Sound, Cook Inlet, and the southern coast of Alaska Peninsula, to Unimak Pass; and western Alaska, the north shore of the Alaska Peninsula, including the Aleutian Islands westward from Unimak Pass, Bristol Bay, and the Kuskokwim and Yukon Rivers. These divisions are solely for statistical purposes and do not coincide with districts made under reservations created during the calendar year, which include areas from both the central and western statistical divisions.

Detailed reports and statistical tables dealing with the various fishery industries are presented herewith, and there are also given the important features of certain subjects that were the objects of special investigation or inquiry.

WATERS CLOSED TO COMMERCIAL FISHING.

Restrictions and limitations imposed by previous orders of the Department of Commerce prohibited all commercial fishing in the streams and lakes of Alaska and within a zone extending 500 yards off the mouths of all streams, with the exception of the Ugashik and Karluk Rivers, where, owing to peculiar geographic conditions, specified districts remained open to fishing. Executive orders previously issued remain in effect also with regard to the Afognak Reservation, Aleutian Islands Reservation, Yes Bay and Stream, and the Annette Island Fishery Reserve. Executive orders issued in 1922 established two new reservations—the Alaska Peninsula Fisheries Reservation and the Southwestern Alaska Fisheries Reservation.

ALASKA PENINSULA FISHERIES RESERVATION.

By Executive order of February 17, 1922, the Alaska Peninsula Fisheries Reservation was created. It extends eastward from the Aleutian Islands Reservation to a line from Foggy Cape, on the eastern end of Sutwik Island, to Cape Menshikof, on the northern shore of the Alaska Peninsula, and includes the Shumagin Islands and the territorial waters adjacent to these lands and also the lands of the Aleutian Islands Reservation. The text of the order is as follows:

> In addition to the islands of the Aleutian Chain, Alaska, withdrawn and made a preserve and breeding ground for native birds, for the propagation of reindeer and fur-bearing animals, and for the encouragement and development of fisheries, by the Executive order of March 3, 1913 (No. 1733), as modified

by the Executive order of August 11, 1916 (No. 2442), a reservation comprising the islands, peninsulas, and lands adjoining the eastern end of the reservation established by the said Executive order of March 3, 1913, and extending in an easterly and northerly direction from Isanotski Strait to a line extending from low-water mark at Foggy Cape on the eastern end of Sutwik Island to low-water mark at Cape Menshikof on the northern shore of the Alaska Peninsula, including the Shumagin Islands and all other islands, peninsulas, or parts thereof within the described area, is hereby set apart as a preserve to more effectively insure the protection of the fisheries and for their encouragement and development. This latter reservation is to be known as the Alaska Peninsula Fisheries Reservation.

It is hereby further ordered that all straits, bays, and other waters over which the United States has jurisdiction by reason of their relation and proximity to the islands, peninsulas, and other lands to which this order, as well as the said order of March 3, 1913, applies, be, and the same are hereby, reserved and set apart also as a preserve to more effectively insure the protection of the fisheries and for their encouragement and development.

The Secretary of Commerce shall have power to make regulations for the proper administration of the said Alaska Peninsula Fisheries Reservation and the straits, bays, and other waters reserved by this Executive order.

The establishment of the reservations under this Executive order shall not interfere with the use of the waters, islands, or other lands for lighthouse, military, naval, or other public purposes, nor with the use of any of said islands or other lands under the laws of the United States for town-site purposes, mining purposes, or grazing of animals thereupon, under rules and regulations to be established by the Secretary of the Interior.

Under authority of the above Executive order the department, under date of April 18, 1922, issued the following regulations:

1. For purposes of administration the following six fishing districts are created:

(*a*) *Port Heiden district.*—Extends along the Bering Sea shores of the reservation from its eastern limit to the one hundred and sixtieth meridian of west longitude.

(*b*) *Port Moller district.*—Extends along the Bering Sea shores of the reservation from the one hundred and sixtieth meridian of west longitude to the north entrance of Isanotski Strait (otherwise commonly known as False Pass), which forms its western boundary.

(*c*) *Ikatan district.*—Includes Isanotski Strait south of its northern entrance and extends thence along the Pacific shore of the reservation eastward to the one hundred and sixty-first meridian of west longitude.

(*d*) *Shumagin district.*—Includes the Shumagin Islands and the mainland shores and islands of the Pacific side of the reservation from the one hundred and sixty-first to the one hundred and fifty-ninth meridian of west longitude.

(*e*) *Chignik district.*—Extends from the one hundred and fifty-ninth meridian of west longitude along the Pacific shores of the reservation to its eastern margin.

(*f*) *Aleutian Islands district.*—Waters over which the United States has jurisdiction from Isanotski Strait westward throughout the entire Aleutian Islands reservation.

2. No individual or concern shall engage in the business of catching, canning, or preparing salmon, except for personal or family use and not for sale or barter, within the above-stated districts without first securing a permit from the Secretary of Commerce. Applications for annual permits shall be addressed on or before January 15 of each year to the Secretary of Commerce, Washington, D. C., and shall give full information on the following points: (*a*) Name and permanent address of person or corporation desiring permit; (*b*) character of business proposed, whether fishing, canning, salting, or otherwise curing fish; (*c*) character and extent of plant to be operated and its location; (*d*) method and extent of fishing proposed; (*e*) exact place or places where fishing is to be carried on; (*f*) number and kind of each class of fishing apparatus to be used; (*g*) number of cases of salmon to be packed (based upon 48 one-pound cans per case) or number of barrels of salmon to be salted or tierces of salmon to be mild cured; (*h*) when operations are to begin; (*i*) if application is for continuance of operations formerly conducted, the catch and pack of salmon by species and the amount of each class of gear operated in the next preceding sea-

son must be shown; (*j*) affidavit as to correctness of facts set forth in the application must be made by competent authority.

3. Permits will specify the amount of pack and the character and extent of fishing operations allowed.

4. Permits for the season of 1922 will be issued only to such individuals or concerns as are now operating within the reservation.

5. Permits will be valid only within the district for which issued.

6. Transportation of fresh salmon for canning, salting, or otherwise preserving will not be permitted from one fishing district to another or outside the reservation.

7. These regulations do not apply to persons taking salmon with rod, hand line, or spear for their personal or family use and not for sale or barter.

8. These regulations will be subject to such annual revision by the Secretary of Commerce as may appear advisable in view of the investigation and the experience of the preceding season.

9. These regulations will be in full force and effect immediately from and after date of issue.

Under date of December 14, 1922, revised regulations for the reservation were issued as follows:

1. For the purposes of administration the following six fishing districts are created:

(*a*) *Port Heiden district.*—Extends along the Bering Sea shores of the reservation from its eastern limit to the one hundred and sixtieth meridian of west longitude.

(*b*) *Port Moller district.*—Extends along the Bering Sea shores of the reservation from the one hundred and sixtieth meridian of west longitude to the north entrance of Isanotski Strait (otherwise commonly known as False Pass), which forms its western boundary.

(*c*) *Ikatan district.*—Includes Isanotski Strait south of its northern entrance, the waters surrounding Unimak and the Sanak Islands, and the waters to the eastward along the Pacific shores of the reservation to the one hundred and sixty-first meridian of west longitude.

(*d*) *Shumagin district.*—Includes the Shumagin Islands and the mainland shores and islands of the Pacific side of the reservation from the one hundred and sixty-first to the one hundred and fifty-ninth meridian of west longitude.

(*e*) *Chignik district.*—Extends from the one hundred and fifty-ninth meridian of west longitude along the Pacific shores of the reservation to its eastern margin.

(*f*) *Aleutian Islands district.*—Waters over which the United States has jurisdiction from Unimak Pass westward throughout the entire Aleutian Islands Reservation.

2. No individual shall engage in the business of catching, canning, or preparing salmon, except for personal or family use and not for sale or barter, within the above-stated districts without first securing a permit from the Secretary of Commerce. Applications for annual permits shall be made on or before January 15, 1923, and on or before December 15 of each year thereafter, to the Secretary of Commerce, Washington, D. C., and shall give full information on the following points:

(*a*) Name and permanent address of person or corporation desiring permit. (*b*) Character of business proposed, whether fishing, canning, salting, or otherwise curing fish. (*c*) Location and capacity of plant (number of lines of machinery in cannery and whether for pound or half-pound cans). (*d*) Number and kind of each class of fishing gear desired, and location where same is to be operated. (*e*) Number of cases of salmon to be packed (based upon 48 one-pound cans per case), or number of barrels of salmon to be salted, or tierces of salmon to be mild cured. (*f*) If application is for continuance of operations formerly conducted, the catch and pack of salmon by species and the amount of each class of gear operated in the next preceding season must be shown. (*g*) Affidavit as to correctness of facts set forth in the application must be made by competent authority.

3. Permits shall specify the amount of pack allowed, if that be limited, and the character, extent, and locality of fishing operations to be conducted.

4. Transportation of fresh salmon for canning, salting, or otherwise preserving will not be permitted between any two districts or zones within the

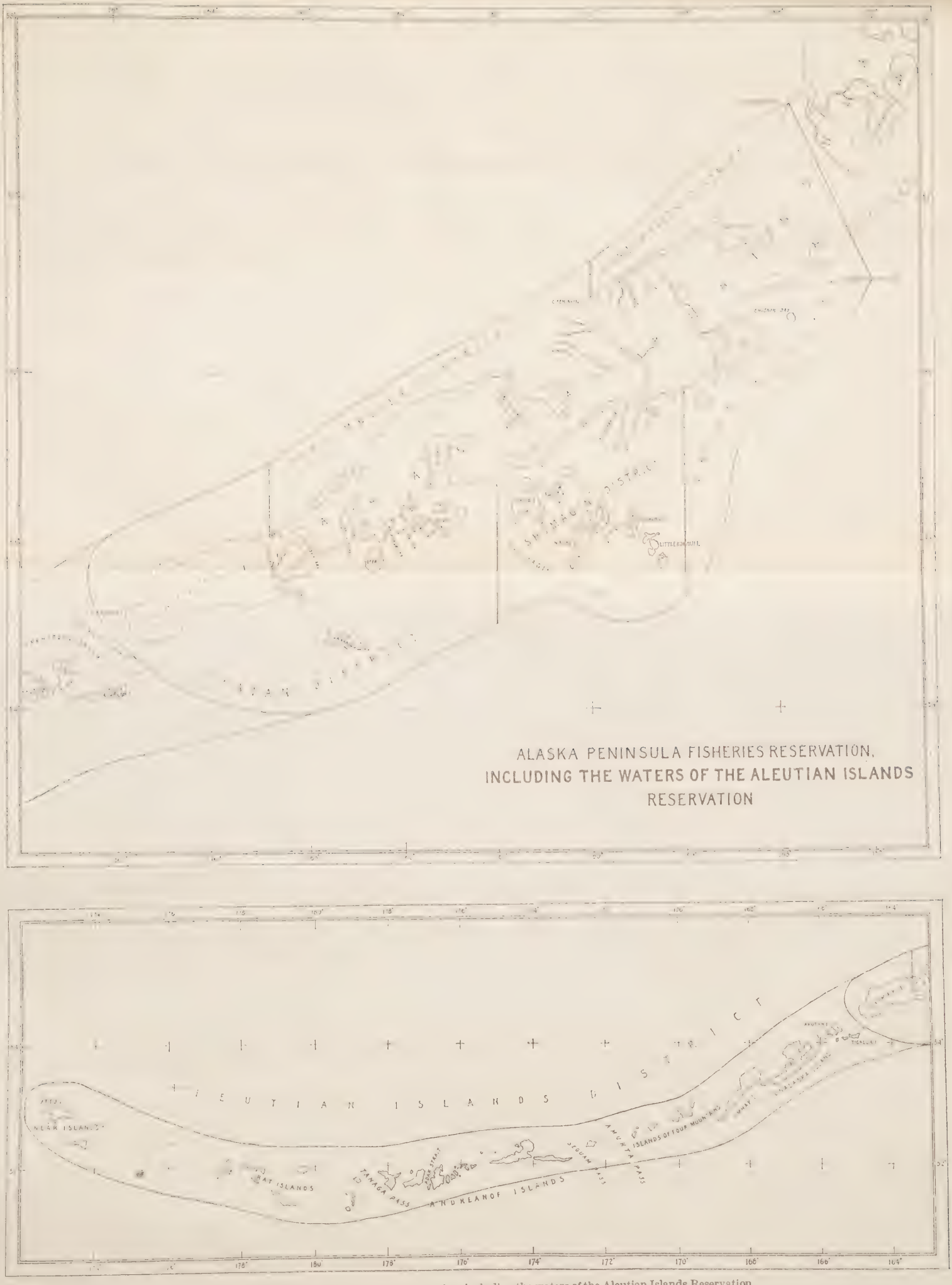


FIG. 2.—Alaska Peninsula Fisheries Reservation, including the waters of the Aleutian Islands Reservation.

reservation or between any district or zone within the reservation and any outside district.

5. The pack of each plant shall be made exclusively from the proceeds of the fishing gear specifically allotted to it. Transfer of salmon from one plant to another will not be permitted; but nothing in these regulations shall prevent the purchase of salmon from natives or local inhabitants who have secured permits to fish.

6. Fox farmers may take and prepare salmon for fox feed in all legal ways but must secure permits from the Secretary of Commerce.

7. These regulations shall be subject to such annual revision by the Secretary of Commerce as may appear advisable in view of the investigation and the experience of the preceding season. They shall be in full force and effect immediately from and after date of issue.

Ten formal permits for commercial salmon-canning operations by established plants within the reservation were granted for the season of 1922, as shown in the table below, which gives also the pack of canned salmon in the reservation. A permit was also granted to George Albert, of Port Heiden, for the salting of not over 700 barrels of all species of salmon, and 30 permits were issued to local residents by Warden J. N. Braun, the bureau's representative in the district, for fishery operations upon a small scale. Approximately 1,570 barrels of salted salmon were prepared under these minor permits.

Pack of canned salmon in the Alaska Peninsula Fisheries Reservation, Alaska, in 1922.

Permit No.	Name of permittee.	Location.	Cohos.	Chums.	Humpbacks.	Kings.	Reds.	Total.
			Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
47	P. E. Harris & Co.	False Pass	.....	4,095	1,678	205	58,634	64,612
48	Joint permit to Pacific American Fisheries, Nelson Lagoon Packing Co., Phoenix Packing Co., and Fidalgo Island Packing Co.	Port Moller	.....	4,004	.....	1,729	44,624	50,357
49	Everett Packing Co.	Herendeen Bay	.....	104	.....	97	15,931	[1] 16,132
50	Pacific American Fisheries	Ikatan	.....	8,215	4,723	458	67,043	80,439
51	do	King Cove	261	15,556	11,403	74	73,028	100,322
52	Shumagin Packing Co.	Squaw Harbor	.....	5,946	2,808	63	27,183	36,000
53	Northwestern Fisheries Co.	Chignik	462	7,413	4,431	52	37,677	50,035
54	Columbia River Packers' Association.	do	521	6,409	5,411	40	37,836	50,217
55	Alaska Packers Association	do	632	7,117	4,701	32	37,811	50,293
	Total		1,876	58,859	35,155	2,750	399,767	498,407

[1] Included in this pack were 520 chum, 312 king, and 194,045 red salmon purchased from a cannery at Ugashik River, hence not taken from the waters of the reservation.

SOUTHWESTERN ALASKA FISHERIES RESERVATION.

With the rapid depletion of the salmon fisheries in other parts of Alaska and the realization that an exodus from the less profitable districts would probably soon occur to such districts as still maintained large runs of the valuable red salmon the bureau felt that some definite action should be taken at once to secure broad enough control of these districts to regulate operations properly and conserve the runs in their present value. Efforts had been made for many years to secure the passage of a fishery law that would enable effectual preservation of the fisheries of Alaska, but always without success because of the opposition of certain divergent interests. As a last resort and as a more or less temporary measure pending the

passage of adequate laws by Congress the President, under date of November 3, 1922, signed an Executive order creating the Southwestern Alaska Fisheries Reservation, including the waters of Bristol Bay, Cook Inlet, and the Kodiak-Afognak region. The text of the order is as follows:

Whereas it has become apparent that certain valuable fisheries of Alaska have been seriously impaired and are in danger of further depletion, and that it is necessary to establish authority to meet the exigency which has arisen for the protection of these fisheries, and

Whereas by Executive order issued under date of March 3, 1913, modified by an order of August 11, 1916, a reservation known as the Aleutian Islands Reservation was created, and by an Executive order under date of February 17, 1922, a reservation known as the Alaska Peninsula Fisheries Reservation was created, including therein the lands and the territorial waters of the United States contiguous to the lands covered by said Executive order,

Now, therefore, I, Warren G. Harding, President of the United States of America, by virtue of the power in me vested by the laws of the United States, do hereby set apart as a preserve to more effectively insure the protection of the fisheries and for their encouragement and development, in addition to the above reservations, a reserve of lands and waters, which said reservation shall be known as the Southwestern Alaska Fisheries Reservation, which shall include all territorial waters, and the lands within one-half mile of the shores thereof, within the lines defined as follows:

From the northeasterly point of the Alaska Peninsula Fisheries Reservation at Cape Menshikof, Bristol Bay, northwesterly to a point in latitude 58° 32′ north, longitude 162° 12′ west, off Cape Newenham; thence to a point in latitude 59° 15′ north, longitude 162° 0′ west; thence eastward along parallel of latitude 59° 15′ north, to longitude 155° west; thence to a point in latitude 61° 20′ north, longitude 151° 20′ west; thence to a point in latitude 61° 20′ north, longitude 150° 10′ west; thence to a point in latitude 61° 35′ north, longitude 149° 40′ west; thence to a point in latitude 61° 35′ north, longitude 149° 0′ west; thence to a point in latitude 60° 40′ north, longitude 149° 0′ west; thence to a point in latitude 60° 40′ north, longitude 151° 0′ west; thence to a point in latitude 57° 30′ north, longitude 151° west; thence to a point in latitude 55° 0′ north, longitude 157° 0′ west; thence to low-water mark at the eastern extremity of Foggy Cape on Sutwik Island; thence to point of beginning.

Fishery operations within the said Southwestern Alaska Fisheries Reservation shall be subject to such regulations and restrictions as shall be issued by the Secretary of Commerce, in addition to the general fisheries laws and regulations of the United States as administered by the Secretary of Commerce.

The reservation hereby established shall not interfere with the use of the waters, islands, or other lands embraced therein for any purpose not inconsistent therewith, nor with the operation therein of the laws now or hereafter applicable to the public lands in Alaska, nor with the respective jurisdictions of the Secretary of Agriculture and the Secretary of the Interior thereover.

Warning is hereby expressly given to all unauthorized persons not to fish in or use any of the waters herein described or mentioned.

Following the issuance and publication of the order, announcement was made that the Commissioner of Fisheries would hold hearings at Seattle on November 21 and at San Francisco on November 28, at which all interested persons were invited to be present and discuss the conditions and needs of the fishery, in order to establish a basis of information for the issuance of the necessary regulations and the granting of permits for operations to be carried on in 1923. Dr. Charles H. Gilbert, of Stanford University, who conducted extensive investigations in southwestern Alaska during the season of 1922, was present at and assisted in the conduct of the hearings. Dennis Winn, agent, Alaska service, who was in the Bristol Bay region during the fishing season, and Ransom L. Wilkins, who was stationed in Cook Inlet district, were present at the Seattle hearing.

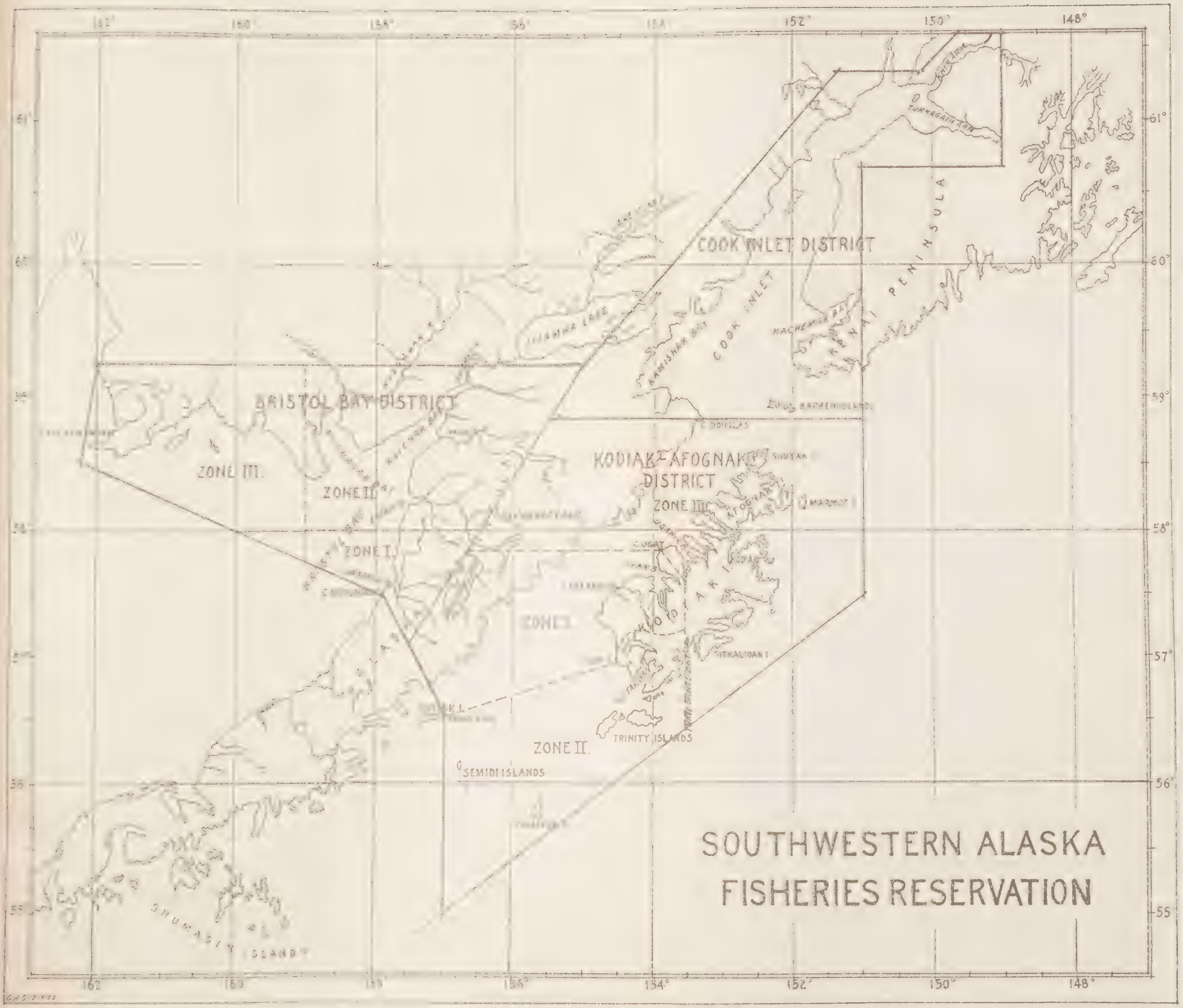


FIG. 3.—Southwestern Alaska Fisheries Reservation.

Regulations for the administration of the reservation were issued by the Secretary of Commerce on December 16, 1922, as follows:

1. For purposes of administration the following districts and zones are established:

(*a*) *Bristol Bay district.*—All that portion of the reservation lying within the Bering Sea, the coast line extending from Cape Menshikof to Cape Newenham and thence northward to 59° 15′ north latitude.

Zone 1. Including all the Ugashik fishing grounds which lie northerly and westerly from Cape Menshikof and are included between the boundary of the reservation and the fifty-eighth parallel of north latitude east of the one hundred and fifty-ninth meridian.

Zone 2. All that portion of Bristol Bay north of the fifty-eighth parallel of north latitude and east of the one hundred and fifty-ninth meridian, including the Egegik, Naknek, Kvichak, and Nushagak fishing areas.

Zone 3. All waters of the Bering Sea included in the reservation, but not included in zones 1 and 2.

(*b*) *Cook Inlet district.*—Embracing all that portion of the reservation east of Bristol Bay and north of the latitude of Cape Douglas (approximately 58° 50′), including the Barren Islands, the shores and outlying islands of the Kenai Peninsula, and all the shores and waters of Cook Inlet.

(*c*) *Kodiak-Afognak district.*—All that portion of the reservation south and east of the Alaska Peninsula and south of the latitude of Cape Douglas, including the Kodiak-Afognak group of islands, the Trinity and the Semidi groups, Chirikof Island, Shelikof Strait, and all the mainland shores from Cape Douglas to the southwestern boundary of the reservation.

Zone 1. Extends on Kodiak Island from Low Cape to Cape Ugat, and on the mainland coast from the latitude of Cape Ugat to the western limit of the reservation. Includes Red and Karluk Rivers and Uyak Bay.

Zone 2. Extends from Low Cape on the western coast of Kodiak Island to but not including Three Saints Bay, on the southeastern coast, and includes Alitak and Olga Bays and Chirikof, Trinity, and Semidi Islands.

Zone 3. Embraces all that portion of the district not included in zones 1 and 2. Includes the western shores of Kodiak and Afognak Islands north of the latitude of Cape Ugat and the northern and eastern shores as far south as Three Saints Bay. It also includes Shelikof Strait and the mainland shores north of the latitude of Cape Ugat.

2. No individual shall engage in the business of catching, canning, or preparing salmon, except for personal or family use and not for sale or barter, within the above-stated districts without first securing a permit from the Secretary of Commerce. Applications for annual permits shall be made on or before January 15, 1923, and on or before December 15 of each year thereafter, to the Secretary of Commerce, Washington, D. C., and shall give full information on the following points: (*a*) Name and permanent address of person or corporation desiring permit. (*b*) Character of business proposed, whether fishing, canning, salting, or otherwise curing fish. (*c*) Location and capacity of plant (number of lines of machinery in cannery and whether for pound or half-pound cans). (*d*) Number and kind of each class of fishing gear desired and location where same is to be operated. (*e*) Number of cases of salmon to be packed (based upon 48 one-pound cans per case) or number of barrels of salmon to be salted, or tierces of salmon to be mild cured. (*f*) If application is for continuance of operations formerly conducted, the catch and pack of salmon by species and the amount of each class of gear operated in the next preceding season must be shown. (*g*) Affidavit as to correctness of facts set forth in the application must be made by competent authority.

3. Permits shall specify the amount of pack allowed, if that be limited, and the character, extent, and locality of fishing operations to be conducted.

4. The use of purse seines in fishing for salmon will not be permitted within the reservation.

5. Fox farmers may take and prepare salmon for fox feed in all legal ways, but must secure permits from the Secretary of Commerce.

6. Transportation of fresh salmon for canning, salting, or otherwise preserving will not be permitted between any two districts or zones within the reservation or between any district or zone within the reservation and any outside district.

7. Throughout the Cook Inlet and the Kodiak-Afognak districts the pack of each plant shall be made exclusively from the proceeds of the fishing gear specifically allotted to it. Transfer of salmon from one plant to another will not be permitted.

8. Nothing in these regulations shall prevent the purchase of salmon from natives, local inhabitants, or other individuals who have secured permits to fish within areas properly tributary to the cannery, but fish so purchased shall not be in excess of the pack limit which may be allotted.

9. No fishing for salmon shall be permitted in Chinik Inlet, Kamishak Bay, within a line which joins the outer headlands of the inlet and passes outside the two small islands which lie near its entrance. Markers shall be placed on the headlands to designate the closed areas.

10. In the Bristol Bay district the following regulations shall be in effect: (*a*) In zone 2 it is permitted that fishing boats discharge their catch wherever convenient, but lighters or other collecting boats shall not transport salmon from the Nushagak fishing grounds to the canneries along the east shore, nor from the Egegik-Naknek-Kvichak fishing grounds to the Nushagak canneries. For the purposes of this regulation the fishing grounds off Cape Etolin shall be considered as belonging to the Nushagak River. (*b*) Fishing for salmon for commercial purposes shall be conducted solely by the use of drift gill nets, except that traps operated in the season of 1922 in the Nushagak region may continue to operate during the season of 1923. In 1924 and in subsequent years no traps shall be driven or operated in the Bristol Bay district. (*c*) King salmon nets shall have a mesh not less than 8½ inches knit measure, and red-salmon nets, after the season of 1923, a mesh not less than 5¾ inches stretched measure between knots. For the season of 1923 only, red-salmon nets will be permitted with mesh as small as 5½ inches, measured as above. (*d*) Companies operating motor gill-net fishing boats during the season of 1922 may continue their use in 1923, but the use of motor fishing boats will not be permitted in the Bristol Bay district after the season of 1923. (*e*) Each fishing boat may be provided with gill nets not to exceed in length 200 fathoms hung measure. (*f*) Fishing for red salmon shall not begin prior to midnight of June 25 and shall close at or before midnight of July 25 of each year; but each cannery may operate one commissary net at any time to supply fresh salmon for the mess. Salmon traps shall not be operated prior to midnight of June 25. (*g*) Fishing for king salmon with drift gill nets having a mesh not less than 8½ inches knit measure is permitted prior to June 26, as well as after that date; but the total length of gill nets employed by any fishing boat at one time shall not exceed 200 fathoms.

11. These regulations shall be subject to such annual revision by the Secretary of Commerce as may appear advisable in view of the investigation and the experience of the preceding season. They shall be in full force and effect immediately from and after date of issue.

AFOGNAK RESERVATION.

During the 1922 salmon-fishing season 60 Afognak and Uzinki (Spruce Island) natives were granted permits to engage in commercial fishing in the Afognak Reservation. These natives operated 19 beach seines, averaging 125 fathoms in length, 5 at Malina, 6 at Paramanoff, 4 at Seal Bay, and 4 at Little Afognak, with 15 natives working at each locality.

On May 25 fishing was begun at Malina and on September 6 ended at Little Afognak. During this period 173,255 salmon of all species were taken within the reservation, of which 84,411 were purchased by the Kadiak Fisheries Co. and 88,844 by the Katmai Packing Co.

At the principal bays closed seasons were imposed, as has been the custom for many years, in order to insure against overfishing and to provide sufficient escapement to the spawning grounds. Warden William E. Baumann, who was in charge of the general enforcement of the fisheries laws and the patrol work of the Afognak Reservation, established these close periods at the height of the red-salmon runs in the various localities.

Fishing periods in principal bays of Afognak Reservation in 1922.

Locality.	Fishing began.	Fishing ended.	Close season.	Number days closed.
Malina	May 25	Aug. 1	July 17–22	6
Paramanoff Bay	June 5	July 25	July 5–8	4
Seal Bay	June 16	...do....	June 12–15	4
Little Afognak	May 24	Sept. 6	June 21–24	4

To secure information as to escapement, Mr. Baumann visited the headwaters of the various streams and found that an adequate number of salmon appeared to have ascended to the spawning grounds and that conditions generally compared favorably with previous seasons.

The total catch of all species of salmon taken in the waters of the Afognak Reservation in 1922 was 173,255, as compared with 192,694 in 1921, a decrease of 10 per cent. This decrease is probably due to the fact that fishing activities were less intensive during the latter part of the season in the Afognak Reservation than during the same period in 1921. When the fishing season was well under way at Karluk, labor troubles arose among the fishermen, who called a general strike, which necessitated the employment of native fishermen. Several Afognak natives were employed at Uyak Bay by the Northwestern Fisheries Co. and several in the Karluk district by the Katmai Packing Co.

Commercial catch of salmon in waters of Afognak Reservation in 1922.

Locality.	Coho.	Chum.	Humpback.	King.	Red.	Total.
Little Afognak	11,609	.....	2,141	17	5,241	19,008
Danger Bay	2,777	.....	16,680	.....	14	19,471
Litnik Bay	17,569	.....	.....	.....	117	17,686
Paramanoff Bay	.....	485	9,731	7	14,228	24,451
Malina	2,905	82	65,366	.....	17,123	85,476
Seal Bay	.....	.....	154	6	5,426	5,586
Zelaif[1]	1,112	.....	.....	.....	.....	1,112
Marca Bay[2]	465	.....	.....	.....	.....	465
Total	36,437	567	94,072	30	42,149	173,255

[1] In Raspberry Strait.
[2] Or Markaway Bay, between Litnik Bay and Danger Bay.

ALEUTIAN ISLANDS RESERVATION.

The waters of Aleutian Islands Reservation were embraced in the Alaska Peninsula Fisheries Reservation created by Executive order of February 17, 1922, and the regulations of April 18, 1922, for that reservation were therefore applicable also to fishing in the Aleutian Islands. Because of the remoteness of the district and the slowness of communication by mail it was deemed desirable to allow operations to continue in the season of 1922 under permits granted to local residents and other operators westward of Unimak Island. Permits for the salmon canneries of the Pacific American Fisheries and P. E. Harris & Co., on the eastern end of Unimak Island, are listed

in the table (p. 11) regarding the Alaska Peninsula Fisheries Reservation. No other permits were granted for the Aleutian Islands proper. At the end of the calendar year notice was mailed to all holders of permits that such permits were canceled and if it was desired to operate in the season of 1923 application for new permits should be made under the revised regulations issued December 14, 1922, for the administration of the Alaska Peninsula Fisheries Reservation.

A permit for the grazing of sheep on Amaknak Island was granted to O. K. Quean jointly by the Secretaries of Agriculture and Commerce under date of February 13, 1922.

ANNETTE ISLAND FISHERY RESERVE.

Fishery operations within the Annette Island Fishery Reserve were again conducted in the season of 1922 by the Annette Island Packing Co. under its lease from the Department of the Interior. Data in regard to operations have been furnished by the Bureau of Education, of that department, which administers the affairs of the reserve for the benefit of the Metlakatla Indians residing therein.

In 1922 the total number of fish taken by traps within the reserve was 847,800, on which a royalty of 1 cent per fish was paid, amounting to $8,478. A fee of $100 each for the five traps operated was also charged. In addition 318,553 salmon were taken by natives in purse seines and gill nets and were purchased by the company for $13,351.26. The natives received $25,425.32 for cannery labor, and other payments brought the total amount disbursed to the Indians by the Annette Island Packing Co. to $52,186.94, which was $13,794.87 more than in 1921. In addition the amounts of $500 for trap fees and $2,478.54 for case tax on canned salmon are due but withheld pending a decision on a suit brought by the Territory of Alaska for collection of territorial license taxes for 1922. This suit was decided in favor of the Federal Government on trial in the United States District Court at Juneau, but was taken on appeal by the Territory to the Circuit Court of Appeals in San Francisco.

The six-year lease to the Annette Island Packing Co. expired October 1, 1922. During this period $11,429.72 was paid to the Indians of the reserve for trap fees and per case tax paid to council, $50,261.27 for salmon taken in traps, $172,465.11 for cannery labor, and $68,526.89 for salmon taken by purse seines and gill nets. Other miscellaneous items brought the grand total to $337,556.30, exclusive of approximately $7,547.30 and the territorial income tax, payment of which is withheld pending decision of the territorial case mentioned above.

STREAM MARKERS.

Considerable work was done in marking the mouths of streams in the southeast district of Alaska in the season of 1922 because of the change in the regulations under date of December 30, 1921, which extended the protected zone from 200 yards to 500 yards off the mouths of all streams. Larger notices and more substantial posts and signs were used. Attention was particularly given to the streams heretofore unmarked along the west coast of Baranof Island from Sitka to Cape Ommaney and through Peril Strait.

Work in the central district consisted principally in the replacement, at the mouths of the sloughs of the Copper River, of markers that had been defaced by weather or carried away by winter storms. Markers were also erected by stream guards at Kachemak Bay, Kamishak Bay, Chinik Inlet, and other localities on Cook Inlet, and at Coghill River, Miners River, Cowpen River, and other places on Prince William Sound. Markers were also posted at the various streams in Olga Bay on Kodiak Island.

In western Alaska attention was given to the replacing of markers at the salmon streams in Bristol Bay, and for the first time markers were established at the mouth of the Kuskokwim River on a line extending from Point Popokamute to Beacon Point. Fishermen have urged that fishing should be permitted up that river as far as Helmick Point, which is 8 miles above the upper end of Eek Island, or at least up to the upper end of Eek Island. The bureau has held, however, that it can not change the markers as placed, as a number of years ago the United States Coast and Geodetic Survey designated these points as the mouth of the Kuskokwim.

STREAM GUARDS.

The plan of augmenting the bureau's patrol force by the employment of stream guards for duty during the active fishing season was carried out on a still larger scale in 1922 than ever before. In all 59 persons were thus employed for varying periods in this service, of which 30 were stationed in the southeast district, 16 in central Alaska, and 13 in Bristol Bay.

In southeast Alaska guards were stationed in the following localities: Chilkoot River, Chilkat River, Excursion Inlet and north shore of Icy Strait, Tenakee Inlet, Freshwater Bay and Redoubt Lake, Glacier Bay and Cross Sound, Whitewater Bay to Killisnoo, south shore of Icy Strait, Port Frederick to Point Adolphus, Redoubt Lake and Basket Bay, Redfish and Whale Bays, Pybus Bay to Point Gardiner and Tebenkof Bay, Gut Bay to Cape Ommaney, Wrangell Narrows, Cholmondeley Sound, Kasaan Bay, Karta Bay, Lake Bay, Rocky and Thorne Bays, Kah Sheets Bay and Carroll Inlet, Point Barrie and Steamer Bay, Salmon Bay and McHenry Inlet, Red Bay, Deweyville and Staney Creek, Hanus Bay, Howard Bay, Auke Cove and Pavlof Harbor, Ratz Harbor, Eagle Creek, Mud Bay to Lisianski Strait, and Anan Creek. The agent in charge of the district reported that the presence of the guards was of unquestioned benefit to the fisheries in preventing encroachments on the streams and closed areas at their mouths, thus permitting a larger escapement of salmon than otherwise would have been the case. The men were chosen chiefly for their knowledge of the country and general interest in the fisheries of Alaska.

In the central district two of the guards were detailed to duty in Cook Inlet, five at various points in Prince William Sound, six on the Copper River Delta, and one each at Bering River, Karluk, and Alitak. Some transfers were made to other localities as the centers of activity changed and operations progressed.

In the Bristol Bay districts the 13 temporary employees were engaged in the destruction of predatory trout in the Naknek, Egegik,

Ugashik, and Nushagak waters before the beginning of active salmon-fishing operations and later were on guard duty near the mouths of these rivers and also at the Igushik River.

FISHERY PATROL.

In 1922 the bureau maintained eight vessels in Alaska for patrol work in connection with the enforcement of the laws for the protection of the seal and salmon fisheries. Of these the *Murre*, *Auklet*, *Petrel*, *Widgeon*, and *Puffin* were stationed in southeast Alaska; and the *Merganser*, *Scoter*, and *Tern*, at Chignik, Bristol Bay, and the Yukon River, respectively. The *Widgeon* and *Scoter* were additions to the bureau's fleet this year, and the *Merganser* was made use of actively for the first time. In addition six launches owned by the Bristol Bay packers were used both for the destruction of predatory trout and in the bureau's patrol. During the fishing season 18 small boats were chartered in the southeast district, 1 in Cook Inlet, and 3 in the Prince William Sound region for periods ranging from 10 to 75 days during the season from May to September.

During the calendar year it is reported that the *Auklet* cruised 6,300 miles, *Murre* 7,708 miles, *Petrel* 5,478 miles, *Puffin* approximately 1,500 miles, *Widgeon* 3,588 miles, and *Tern* 5,015 miles. The *Auklet* and *Murre* were in continuous commission except during the time required to install in each new 40-horsepower engines and to effect necessary alterations and repairs. These improvements have made both vessels better for the bureau's service, and they are now able to make headway against wind and sea that heretofore would have sent them to shelter. The *Petrel* was redecked and remodeled generally and was in commission four months. The Dusenberg engine was taken out and replaced by the 25-horsepower Standard engine from the *Auklet*. The *Puffin* was used chiefly in the protected waters of the west coast of Prince of Wales Island. The *Widgeon* reached Alaska late in August and was in commission the remainder of the year.

In February the *Merganser* was towed to Seattle by the *Auklet*, where a new 16-horsepower engine was installed and certain repairs and alterations were made. The *Merganser* was loaded on the ship *St. Paul* March 27 for transportation to Chignik, reaching there in April.

The *Scoter*, a vessel about 60 feet long and of the seaworthy purse-seine type, was purchased in April for the Bristol Bay district. It was used throughout the season by the agent in charge of the district and proved of great value in keeping in touch with the different sections and in facilitating action in prosecuting law violators.

The *Tern* was used as usual between Fairbanks and the mouth of the Yukon River and in patrol of the delta. The *Swan* remained at Fairbanks during the year but was not in use.

The Coast Guard cutter *Unalga* was stationed in southeast Alaska and rendered cooperative service in connection with fishery matters.

ALASKA FISHERY INTELLIGENCE SERVICE.

The triweekly dissemination of telegraphic information regarding the price of certain fresh and pickled fish to the important fishery centers of southeast and central Alaska was continued by coopera-

FIG. 4.—Camp for temporary stream guard, Copper River district.

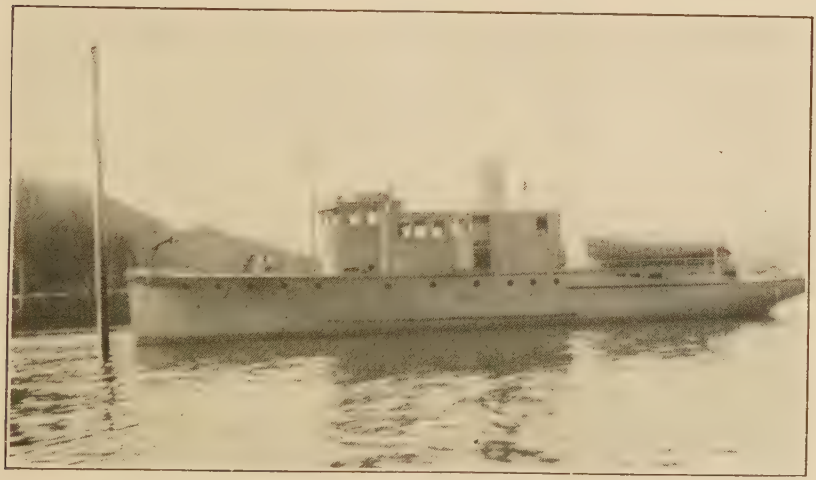


FIG. 5.—Patrol boat *Widgeon*.

tion of the Alaska Military Telegraph & Cable System. The purpose of this service is to make available to the fishermen in the several localities the market quotations on halibut, sablefish, red rockfish, and herring in the important buying centers of Ketchikan and Seattle.

VIOLATIONS OF THE FISHERIES LAWS AND REGULATIONS.

During the season of 1922 there were 17 prosecutions in the Bristol Bay district. In each case the offense consisted in fishing at various distances above the Government markers in the Naknek and Ugashik Rivers. The fines and costs aggregated $2,137.25.

On Saturday, June 17, Stream Guard Neil C. Gallagher apprehended Jack Moore, Peter Kanosh, and Moses Smith while trolling for salmon in Port Frederick during the weekly close season. Each man was using a power boat and fishing with more than one line. They were arraigned before the United States commissioner at Hoonah, pleaded guilty, and each paid a fine of $1 and costs.

On Sunday, June 25, during a patrol off Port Alexander and Cape Ommaney, Earle L. Hunter, master of the *Petrel*, found Charles Olsen, P. Peterson, and L. M. Hair, of Ketchikan, and Edward Thompson and John Thompson, of Seattle, trolling for salmon with power boats, contrary to law and regulations. They were ordered to stop fishing and to go to Port Alexander, where notice was served on each one informing him that he would be reported to the United States attorney for prosecution. In due time this was done, and the attorney advised that he would endeavor to have the *Unalga*, then at Juneau, go to Port Alexander so that he could dispose of the cases, but the commanding officer demurred on the ground that Chatham Strait, in the region of Port Alexander, was unsurveyed and that he could not risk his vessel in those waters. Therefore these cases have not come to trial.

On June 24 Warden O'Connor found Richard T. Marshall trolling for salmon off Point Gardiner at 6.50 p. m. with four lines from a power boat. No action was taken against him as he had but recently returned to Alaska from school in Oregon and probably had not heard that a notice had been issued earlier in the season warning all fishermen that trolling for salmon during the weekly close season, except by line held in the hand, was unlawful.

On July 9 at 1.10 p. m. Warden O'Connor found a trap on Pleasant Island and one on Porpoise Island in Icy Strait, operated by the Thlinket Packing Corporation, with the pot tunnels open. On July 16 he found a trap at Wilson Cove, owned and operated by the Wilson Fisheries Co., with the tunnel but partly closed and the heart walls opened 44 and 23 inches, respectively, at one hour before low water. These matters were laid before the United States attorney, who decided that as they were largely technical offenses it was not worth while to take them up.

On August 9 O. Benjaminson, O. Odsera, and O. E. Fasness made a set with a purse seine within 500 yards of the mouth of a salmon stream 2 miles north of Point Barrie, Kupreanof Island, where Lawrence L. Hick was stationed as stream guard. The case was reported to the commissioner at Wrangell, and warrants were issued and served on Benjaminson and Odsera. They were brought to trial

at Petersburg before a jury which, after due deliberation, found them guilty of a violation of the fishery regulations. They were fined $10 each and the costs of the prosecution, amounting to about $70. Fasness had gone to Seattle, so the case against him is still pending.

On October 16 the grand jury at Juneau indicted Chris Wick, Ole Olson, and Magnus Nygard for fishing within 500 yards of the mouth of a stream entering Redfish Bay, on the southwest coast of Baranof Island. They were arraigned October 19 and entered pleas of not guilty. On October 20 pleas were changed to guilty. Judgment and sentence were filed and entered October 21. Wick was fined $50 and costs and sent to jail for 30 days at Petersburg; Olson was fined the costs of the case and sent to jail at Petersburg for 30 days; Nygard was sentenced to jail for 20 days at Juneau.

In a complaint filed before the commissioner at Craig, James Peratovich was charged with unlawful fishing within 500 yards of the mouth of Klawak Creek, and upon conviction was fined $32.15, including costs of the case. At the same time, and before the same court, a complaint was entered against Jim Dick, charging him with setting a seine entirely across the lagoon of Klawak Creek. He was tried, convicted, and fined $17.15, including costs.

On August 23 a complaint was filed before the commissioner at Ketchikan, charging Clyde Cowan with purse-seine fishing in White River on August 22. He pleaded guilty and was fined $10 and costs.

Warden Combs reported that a trap near Craig, operated by the Alaska Consolidated Canneries, did not have the tunnel closed and the heart walls open on Sunday, July 30, in compliance with law. Owing to the resignation of Mr. Combs on August 31 and his departure from Alaska, this case was not presented for trial.

A controversy arose between the Alaska Consolidated Canneries and the A. & P. Products Corporation over the location of two floating traps along the southern shore of Kanaganut Island, the disputed question being the lateral distance interval between the traps. The A. & P. Products Corporation claimed that its trap was the first one put into position and set for fishing, and that later the Alaska Consolidated Canneries set a trap approximately 1,100 feet westward therefrom, making it fast to a rock submerged at high tide, contrary to the regulations of the War Department. Joint investigations were made by representatives of the bureau and of the engineers office of the War Department at Juneau, as a result of which the permit issued to the Alaska Consolidated Canneries was canceled and the removal of the trap was ordered, because the company had misrepresented the facts by stating in its application for the permit that the trap would be tied to a small island. In view of all the circumstances the United States attorney did not think it advisable to accuse either company of a violation of the fisheries law.

On July 12 John Olson was found fishing with a set gill net covering more than one-third the width of a slough of the Stikine River. Complaint was filed with the commissioner at Wrangell and the case was tried by a jury on July 13, resulting in a disagreement. Further disposition of the case has not been made.

The cases against the Kenai Packing Co. for the wanton waste of salmon and against the Copper River Packing Co. for wanton waste

of salmon and for not opening the heart walls of its trap located in Prince of Wales Passage on Sunday, August 15, 1920, on which indictments were returned at the Valdez term of the district court in October, 1920, were again continued with the consent of the bureau's representative and probably will be brought to trial at the February, 1923, term of court at Valdez.

TERRITORIAL LICENSE TAX.

Fisheries license taxes were collected by the Territory under the revenue laws of Alaska as revised in 1921. A statement from the treasurer, under date of May 9, 1923, gives the collections made to that date for the fiscal year 1922. It was stated that only a comparatively small amount remained uncollected on that date. The total for the calendar year is apparently about $134,000 greater than in the preceding year.

Fishery license taxes collected by Territory for fiscal year ended December 31, 1922.

Schedule.	Division No. 1.	Division No. 2.	Division No. 3.	Total.
Salmon canneries (pack)	$63,481.32		$152,385.45	$215,866.77
Salmon canneries (net income)	2,797.76		18,183.83	20,981.59
Clam canneries	16.30		436.86	453.16
Salteries	3,012.86	$256.20	7,950.21	11,219.27
Cold-storage plants	950.00		375.00	1,325.00
Fresh-fish dealers	3,018.23		13.11	3,031.34
Fish-oil works and fertilizer and fish-meal plants	3,413.33		897.60	4,310.93
Fish traps	51,800.00		31,300.00	83,100.00
Gill and stake nets	684.00	46.00	6,654.50	7,384.50
Seines	2,885.00		1,925.00	4,810.00
Total	132,058.80	302.20	220,121.56	352,482.56

It is of interest to compare the Alaska territorial revenue from all sources with that derived from the fishery industry. The following tabulation covering the last four years for which complete returns are at present available shows that in this period the fishery industry paid an annual average of 48.7 per cent of all territorial revenue:

Comparison of Alaska territorial revenue from all sources with that from fishery industry, 1918–1921.

Year.	Total territorial revenue.	Fishery license tax.	Percentage of fishery tax.
1918	$475,450.55	$265,082.48	55.7
1919	555,887.43	301,301.59	54.2
1920	571,943.34	271,696.43	47.4
1921	563,474.01	218,268.71	38.7
Total	2,166,755.33	1,056,349.21	48.7

WATER-POWER PROJECTS IN ALASKA.

During 1922 the Federal Power Commission referred to the bureau 10 applications for permits for development of water-power projects in Alaska. The importance of this matter is readily apparent, be-

cause of the possibility of hindering or preventing salmon from ascending to their spawning grounds. With respect to the stream covered by each application the commission desired information from the bureau as to whether it was used by spawning salmon, its economic value to the fishery industry, and whether an effective fishway could be constructed over the proposed dam.

The 10 applications referred to the bureau were for Speel River, Cascade Creek, Mill Creek, Aaron Creek, Harding Creek, Grant Creek, Tyee Creek, White River, and Anan Creek, in the southeast district, and Kenai River in central Alaska. Thorough investigation of the streams concerned in southeast Alaska was made during the season by Assistant Agent E. M. Ball. and of the Kenai River by Assistant Agent Shirley A. Baker. Upon the basis of their reports and other information on file in the bureau, the Federal Power Commission was advised that there was no objection to the development of the proposed projects in Speel River, Cascade Creek, Harding Creek, Grant Creek, Tyee Creek, and White River, inasmuch as there were no commercial runs of salmon in them. No objection was made regarding Mill Creek, as the proposed dam would not be too high to prevent the installation of a successful fishway. The contemplated project in Aaron Creek affected only one fork of that stream, and the remaining spawning beds were regarded as ample for the preservation of the run.

In the case of Anan Creek the bureau expressed unqualified opposition to any project that contemplated its use for any purpose other than the propagation of salmon under natural conditions. As bearing upon this stream, the following is quoted from a letter of January 30, 1923, addressed by the Secretary of Commerce to the Federal Power Commission:

> Anan Creek has long been known as one of the most important humpback-salmon streams in southeastern Alaska. It has been a large and steady producer for more than 20 years—in fact, it has yielded about a million salmon in a single season—and it continues to be a salmon producer of the first magnitude. It embraces a spawning area of unequaled excellence approximately 4 miles in length. Its economic importance to the fishery industry is second to none in southeastern Alaska. The erection of a 60-foot dam at the mouth of Anan Creek would practically destroy one of the most valuable salmon fisheries of southeastern Alaska for two reasons: (*a*) That a successful fishway of that height would be impracticable, and (*b*) that the spawning grounds would be flooded with several feet of water, thus greatly lessening their value. In view of these things it is the opinion of this department that Anan Creek should not be used for any other purpose than the production of salmon. Unquestionably there are numerous streams in southeastern Alaska that are better adapted to the development of electric power than Anan Creek and which are inaccessible to salmon by reason of natural insurmountable barriers.

Opposition was also expressed to the development of the project contemplated on Kenai River, which was discussed in the same letter, as follows:

> It is understood that this project involves the construction of a storage dam 6 feet in height at the outlet of Kenai Lake and a diversion dam 120 feet high at a point about 11 miles below the lake. The department has given very careful consideration to this matter, and an extended personal investigation in the region has been made by an agent of the Bureau of Fisheries. As a result two important outstanding facts are developed: (*a*) That the main run of red salmon spawns in the upper Kenai River waters above the proposed diversion dam in Kenai River Canyon; (*b*) that the tributary streams below the proposed diversion dam carry almost negligible runs of red salmon.

These two important facts have most vital bearing on the subject under discussion. The Kenai River is by far the most important salmon stream in Cook Inlet, and it is believed that the salmon industry of that region would be irreparably ruined if the run in the Kenai River were to be destroyed, which would, I believe, be the practical effect of the proposed power projects. If the run on the Kenai River were stopped, it would probably necessitate the closing of several large salmon canneries, including those of Libby, McNeill & Libby, Northwestern Fisheries Co., Alaska Packers Association, and Fidalgo Island Packing Co., and would also limit the operations of various smaller canneries and salting stations perhaps to such an extent that they would eventually be compelled to close.

Flowing into Kenai River and Kenai Lake above the proposed dam site in the canyon are six remarkably fine salmon streams, all of which carry good runs of red salmon. They are as follows: Russian River, Trail Creek, Ptarmigan Creek, Quartz Creek, Chain Lake Creek, and Snow River. Below the proposed project and between Skilak Lake and the mouth of Kenai River there are only three worth-while salmon streams, and they contain mixed runs with few reds, the latter being the most valuable and sought-after species. These streams are Killey River, Funny River, and Moose River. Although Skilak Lake has valuable spawning areas on the north shore, it is, nevertheless, of minor value, as the tributaries which flow into this lake are not red-salmon streams.

Kenai Lake shows that it has remarkable fitness for supporting fish life and is the chief spawning lake of the Kenai River basin, being the lake where the greater portion of the young red salmon spend the first year of their lives before proceeding to salt water.

The agent of the Bureau of Fisheries who investigated the matter states that a 120-foot dam in the Kenai River would flood a tract averaging 1 mile in width and 8 miles in length, and that this flooded area would cover Chain Lake Creek and its first head lake. Thus, a very valuable spawning area would be lost even if the salmon could get over the dam, which seems to be wholly out of the question.

The report in question shows that there are documents on file in the Cordova office of the Forest Service which indicate the intention to utilize Russian River waters in connection with the Kenai River project. Russian River is the chief red salmon tributary of the Kenai River, flowing into the larger stream about 5 miles above the Kenai River Canyon. The construction of a high dam on Russian River would be a most serious blow to the salmon industry.

In the matter of possible hatchery operations above the dam in Kenai River Canyon, the following is extracted from the report of the investigating agent:

"In the letter from the Federal Power Commission, under date of May 22, 1922, the suggestion has been made to put in a hatchery above the dam. It would be absolutely impracticable to put in a hatchery either above the dam or below the dam and to corral the red salmon until they are ripe. As it is now, the mature salmon come into the lake to ripen. The young red salmon must live a year in the lake—sometimes they stay longer—before going to the ocean waters. It is impracticable and impossible to accommodate in a hatchery the spawning adults and the young fry of the great Kenai River red-salmon run. Therefore the project of the establishment of a hatchery either above or below the dam is a forlorn hope and should not be entertained at all."

The matter of the proposed power project on the Kenai River, Alaska, was rather recently referred to Dr. C. H. Gilbert, of Stanford University, who is a noted authority on the salmons of the Pacific coast and Alaska. Dr. Gilbert's reply is as follows:

"I beg to express my conviction that the proposed dams between the Kenai and Skilak Lakes would result in reducing the red-salmon run in the Kenai River to such a point that it would cease to have any commercial significance. I believe it would be wholly impracticable to construct a fishway over a dam of the height proposed, and I regard it as equally impracticable to operate successfully a hatchery below the dam. The red salmon on their ascent of the river are far too green to spawn. It is their habit to remain in the deep waters of the lake for a month or more until their eggs are ripe. To impound them for this purpose in the river below the dam would certainly result in the loss of a large percentage of the spawning fish. The Kenai River is the most important red-salmon stream of Cook Inlet. If the Kenai run is destroyed, the Cook Inlet salmon fisheries will go with it. I recommend that the Bureau of

Fisheries use its influence in opposition to the construction of the proposed dams."

This department desires to express the hope that the proposed power project on Kenai River will not be undertaken, for if it is there is apparently no way of saving the salmon run of the Cook Inlet region.

The Federal Power Commission advised the applicants in the case of Anan Creek and Kenai River that it is doubtful if the commission would feel justified in disregarding the desires of the Department of Commerce and that it would probably refuse to grant a license for the projects under present conditions.

TAGGING OF SALMON.

In the attempt to ascertain what streams form the spawning grounds of the red salmon that constitute important runs along the Alaska Peninsula and the migration routes followed in reaching these streams extensive tagging experiments were carried out by Dr. C. H. Gilbert and W. H. Rich in the Shumagin Islands, in Morzhovoi and Ikatan Bays, and at Port Moller. Consecutively numbered aluminum tags were attached to 4,000 red salmon, which were then released and of which nearly 20 per cent were later recaptured. The most important result of the experiments was the demonstration that a large body of Bering Sea red salmon use as feeding grounds the district south of the Alaska Peninsula and on attaining maturity return to Bering Sea and distribute themselves to the red-salmon streams of the peninsula and Bristol Bay and pass as far north even as the Kuskokwim River. This discovery has an important bearing on the problem of conserving the vastly important red-salmon runs of Bristol Bay. It is planned to continue this work upon a larger scale during the season of 1923.

SALMON FOR FOX FOOD.

The notable expansion of the fox-farming industry in Alaska within the last year or two has correspondingly increased the use of salmon for fox food. This has occurred along with the constantly growing demand upon the runs of salmon for cannery use and during a period when the future of the salmon supply has been viewed with grave apprehension. Consequently, in the season of 1922 representatives of the bureau were instructed to make a careful investigation to determine the extent of the use of salmon for fox food, the places and methods of procurement, and whether other sources of food less esteemed for human consumption than salmon might be available.

In September a complete canvass of southeast Alaska was made under the supervision of Assistant Agent E. M. Ball, which showed 75 fox farms stocked with approximately 4,500 foxes. At the time there was on hand a total of 654,550 pounds of food, about half of which consisted of salmon heads obtained from canneries, while the remainder was whole fish, chiefly chum salmon. It was estimated that to carry these animals through until the following summer approximately 642,000 pounds additional would be required, practically all salmon if obtainable. This means an average daily ration of about three-quarters of a pound of fish for each fox, to which is added about one-quarter of a pound of other food, chiefly cereals. Other species of fish, such as halibut, sablefish, flounders, and her-

ring, are used to some extent in southeast Alaska, but are not regarded as the best fox food. Fish that can be dried are preferable, as the foxes do not relish salted fish. Few of the fox farmers do their own fishing, usually purchasing salmon from packing companies and operators of independent traps, purse seines, and other fishing apparatus.

In the Prince William Sound, Cook Inlet, and Kodiak-Afognak regions of central Alaska a careful survey of the situation was made under the direction of Assistant Agent Shirley A. Baker. In this part of the Territory 87 fox farms were listed, upon 42 of which 1,649 foxes were reported. The reticence of operators made it practically impossible to get an approximation of animals on quite a number of farms. It was computed that in the season of 1922 in this district 270,770 salmon were taken for fox food, of which 26,600 were reds, 191,000 humpbacks, 29,200 chums, and 23,970 cohos. These fox farmers supplement the supply of salmon with other foods, including herring, cod, skates, sharks, hair seals, porcupines, rabbits, and cereals.

Fishing for salmon for use on fox ranches comes strictly under the head of commercial operations and is subject to all restrictions imposed by the laws and regulations. Fishing on the spawning beds and within streams in order to supply fox ranches is as much in violation of the regulations as if salmon so caught were for cannery use. There is no more certain method of depleting the runs of salmon than to take them from the spawning beds. Some fox farmers have seemed concerned lest such full protection of the salmon might work an undue hardship by depriving them of enough food for their foxes. It is not the intention to burden the fox farmers or to prevent in any way the legitimate development of their business, but at the same time care must be taken to preserve the salmon industry by absolute avoidance of commercial fishing within the streams. It is believed that reasonable foresight upon the part of fox farmers in securing the heads of salmon from canneries and in obtaining surplus salmon, particularly of the cheaper grades, from outside waters will fully meet all needs along this line.

BRISTOL BAY DISTRICT.

In 1922 a special force consisting of two regular wardens and a number of other employees under the direction of Agent Dennis Winn was again sent into the Bristol Bay district. As in the previous season, efforts were devoted during the spring to the destruction of predatory fishes, and after the beginning of active salmon-fishing operations a patrol was maintained on Bristol Bay and in all tributary rivers. Very satisfactory work was accomplished. Two employees were detailed to remain over the winter and make a thorough survey of the spawning grounds of the Wood River lake system. The report submitted by Mr. Winn follows:

GENERAL REPORT OF SEASON'S OPERATIONS.

Operations in the season of 1922 were conducted along the line of previous years. The operators necessary to conduct the work of the different sectors were engaged in the States and Alaska, preference being given to suitable help procurable in Alaska. Owing to the scarcity of such help around Bristol Bay it was necessary to send most of the employees from the States.

Transportation for nine men was granted on the Alaska Packers Association ship *Star of Lapland* from Semiahmoo, Wash., to Bristol Bay. The Alaska-Portland Packers' Association ship *Berlin*, Portland, Oreg., transported three men, supplies, and equipment, and two launches and quantities of fuel oil for the summer's work at Naknek. The *Burgess* of the same company transported supplies, equipment, and fuel oil, and the Columbia River Packers' Association ship *St. Nicholas*, Astoria, Oreg., furnished passage for three men and transported one launch for Nushagak operations. Various ships of the Alaska Packers Association transported needed supplies and equipment to the sectors operated at Kvichak, Egegik, and Ugashik, together with necessary fuel oil for the same districts.

On the return passage was furnished for seven men on the Alaska Packers Association ship *Star of Zealand* and for one man on the *Indiana* to San Francisco, for three men on the Alaska-Portland Packers' Association ship *Chillicothe*, for two men on the ship *Burgess* of the same company, and for three men on the Columbia River Packers' Association ship *St. Nicholas* to Astoria.

The writer and an assistant proceeded over the regular transportation route from Seattle to Anchorage, across Cook Inlet via launch to Iliamna Bay, thence over the divide to Iliamna Village by snowshoes, thence after the ice break-up to Bristol Bay, in which section the former supervised the work to the end of the season, after which the return trip was made over the same route to the States.

In compliance with the recommendation of the previous season the bureau purchased in Bristol Bay a cruising boat of the purse-seine type that had been towed up from the States by the Alaska-Portland Packers' Association steamer *Akutan*. This boat, known before the purchase as the *Clatsop*, was rechristened *Scoter* by the bureau. It met every expectation, made it possible to keep in close touch with the different crews, and minimized the difficulties of getting action in prosecuting law violators, which was never successful with the facilities of previous years.

Three small launches of the Columbia River trolling-boat type, purchased by the packers for the bureau's operations, were used for trout work and stream patrol. As some repairs were necessary to two of the launches it was late before they could be placed in commission, but they were all especially useful in patrol work.

Before the arrival of the writer in Bristol Bay Warden A. T. Looff assumed charge and placed the different crews in their allotted districts, using the *Scoter* for transportation. Every courtesy was shown by the cannery superintendents in the different sections visited, and sincere appreciation is expressed for the unselfish assistance given.

Warden A. T. Looff, with an assistant, was detailed by the bureau to remain in the Wood River district for the winter of 1922-23. His duties were to visit the spawning grounds and obtain all information possible regarding the salmon, especially that pertinent to their predatory enemies, and to do whatever was possible to exterminate the latter. A thorough survey of this lake system is contemplated with the hope of obtaining authentic data regarding each tributary stream that will be useful in future work. Such a survey could be accomplished only during the late fall after the departure of the cannery ships.

DESTRUCTION OF PREDATORY FISHES AND BIRDS.

Naknek.—The Naknek crew of three men, in charge of Gus Severson, sailed from Portland on April 21 on the Alaska-Portland Packers' Association bark *Berlin*. Through misfortune the ship ran on Egegik flats, off Egegik River, on May 17. Although no lives were lost and nearly all the supplies and equipment were salvaged, the ship was held fast and broke completely during the summer storms. The evening of May 18 the crew was landed at the Naknek cannery of the Alaska-Portland Packers' Association. Work of preparing equipment, painting dories, etc., was accomplished, and as soon as sufficient mess supplies were available the crew left for Naknek Lake to begin the season's work. Two loaded dories were towed to the foot of the rapids with patrol boat *No. 2*, in charge of Warden A. T. Looff. A few days were spent here fishing the river, using drift nets and gill nets stretched entirely across the stream. The results were good but of short duration. When the catch showed a material reduction camp was moved above the rapids to the outlet of the lake. The loaded dories were lined through the rapids and the Evinrude used for power above that point. Good fishing occurred here. On June 7 the first red salmon made its appearance, but salmon were not numer-

ous before the 12th. Camp was then moved to Kidawik Creek, where good catches of trout occurred up to July 2, when salmon made their appearance in sufficient numbers to compel removal of set nets, and from that time on baited traps and set and hand lines were used.

During the earliest fishing the trout stomachs examined were empty, but from late June to the middle of July practically all contained young salmon. The stomach of one large lake trout contained 40 fingerling migrating salmon. The greater portion of the catch was lake trout (*Cristivomer namaycush*), all extremely large, averaging from 12 to 15 pounds, and one specimen weighing 22 pounds was captured at the mouth of Kidawik Creek. Several specimens weighing 18 pounds were reported.

A trip was attempted up the Savonoski River to the lakes at its head in an endeavor to operate at that point before the advance of the salmon, but water was too low, making it impossible to navigate the river. An investigation was made July 5 in the upper lakes, going there overland from the north shore of Naknek Lake and arriving just below the rapids connecting the two Savonoski lakes. No boats were available on the lakes, so that only limited observations could be made. No salmon or trout were seen in the upper reaches of either lake. However, it was early for salmon in these waters. The water was clear and the shores appeared excellent for spawning. A folding boat that could be carried on the back overland would be useful here, as at several other points that are difficult of access for observations and trout work also. Along the north shore of Naknek Lake a few salmon were observed, but owing to the deposits of ashes their spawning grounds are limited. It was learned without doubt that the islands in this locality are the greatest breeding grounds for terns in the district, and good work was accomplished on this trip in the destruction of their eggs. Several trips were made during the season to all the breeding islands for the purpose of destroying tern eggs.

The crew returned to Kidawik Creek, as the best work could be accomplished there. Many salmon made their appearance in the creek July 11 and the number increased daily, a large portion passing over the falls and into Brooks Lake, of which Kidawik Creek is a tributary. Cohos made their first appearance in the creek July 13, and the main run, which is not large at this point, was entering toward the end of July.

The season's take in this district was 3,436 trout, weighing 41,232 pounds, an average of 12 pounds each. Eighty per cent were lake trout, the remainder being Dolly Vardens, steelhead trout, and pike, in nearly equal proportions. More Dolly Vardens were captured this year than formerly, but the percentage was small. Several fish ducks were taken in the nets each night.

All equipment was overhauled and the boats were painted and stored at the cannery of the Alaska-Portland Packers' Association at Naknek. The crew returned to the States on the *Chillicothe*.

Egegik.—The Egegik party, consisting of H. B. Looff, foreman, and two assistants, left Semiahmoo, Wash., April 16, on the *Star of Lapland*, arrived at Bristol Bay May 16, and transferred as soon as possible to Egegik, establishing base headquarters at the Alaska Packers Association cannery. Supplies being delayed, a sufficient quantity was borrowed from the Libby, McNeill & Libby cannery, which, added to stores from the previous year, enabled the crew to make an early start upriver. Various difficulties and accidents, such as Evinrude trouble, storms, in which one of the loaded dories capsized, and sickness of one of the men, caused some delay. Camp was eventually established at the outlet of the lake on June 1. Fishing with seines and set nets at this point produced fair returns. Great schools of young salmon were noted migrating on June 6, and large numbers of terns were in evidence working on the young salmon and following the schools downstream.

All islands in the vicinity were visited and considerable numbers of tern eggs destroyed. As soon as it became apparent that possibilities at this point were limited camp was moved to the upper end of the lake at Little Becharoff on June 12, where good results were obtained throughout the remainder of the season.

The effects of the fishing of last season were noticeable in the reduced numbers of trout seen at Kanatak Creek and surrounding streams, which are the principal salmon streams in this district and which produced the greater portion of our trout catch last year. Winter men and natives at the village here report that Kanatak Creek was practically clear of trout after our departure last fall.

All creeks in the vicinity were visited with good results, the fishing appliances used being seines, spears, hand and set lines, bait traps, and set nets. Seines were used with considerable success along the lake shore near the mouths of the different streams.

The trout averaged much larger than those taken in previous years and were fat and bright, with every appearance of being sea-run fish. Specimens weighing 8 pounds were common. Those of last year were for the most part thin and emaciated.

The north shore of the main lake was investigated, but conditions were not found to be conducive to extensive spawning. Some salmon were noted near the mouth of several streams, but in much smaller numbers than in the Little Becharoff section. All trout taken were given to the local natives, who dried them for food.

In Salmon Creek 386 trout, all weighing from 6 to 8 pounds, were taken July 3, and red salmon were noted schooling at the creek mouth. The high water of July 7 brought the salmon into many of the creeks in such numbers as to compel the discontinuance of set-net operations in certain streams. Aggressive fishing was conducted in the different streams with movable equipment until the salmon made their appearance in each, after which hand lines, bait traps, and spears were used exclusively.

A most successful method of capture consisted in baiting the lake shores in the vicinity of the streams with trout offal and seining the baited territory. For several successive days an average of 200 trout was taken in this manner, amounting to nearly half a ton, and on July 26, 1,139 Dolly Vardens were caught. Most of this catch were large fish, one specimen weighing 14 pounds, but several were small, measuring from 4 to 8 inches. The total catch for the season aggregated 10,063 fish, all Dolly Vardens, averaging 4 pounds each, or 40,252 pounds weight.

All equipment was overhauled and stored at the Alaska Packers Association cannery, Egegik, and the return trip to the States was made on the Alaska Packers Association ship *Star of Zealand.*

Ugashik.—The Ugashik crew, in charge of William Tanner, were transported on the Alaska Packers Association ship *Star of Lapland* from Semiahmoo, Wash., with the Egegik party. Upon arriving in Bristol Bay there was some delay in starting operations because of engine trouble on the *Scoter*, but the crew was located as soon as possible and base headquarters were established on May 24 at Red Salmon cannery, Ugashik River. A start upstream was made immediately after arrival. Camp was established at the rapids near the foot of the lower lake, where fishing was conducted for several days with meager results.

A barrier with trap was installed across the entire stream to take both ascending and descending fish, in the belief that some migration of trout was possible either way. The results being unsatisfactory, camp was moved to last year's location on the stream between the two lakes. Here the barrier was installed across the stream with trap on one end, where the fish were in the habit of passing, and expectations were more than justified, as trout were intercepted passing up and down stream. Those passing up were bright, having the appearance of sea-run fish, and those caught from the other direction were thin, evidently "spawnouts."

Observations proved that it was late for the early ingress of sea-run trout at the first location, as they had passed into the first lake. They were the fish taken in the trap while attempting to ascend to the second lake, and those captured descending were possibly en route to salt water. At the beginning of operations very large trout were taken, but toward the end their size kept decreasing to very small fish, making the average weight 2½ pounds.

Migrating salmon passed out of the lake in enormous numbers en route to the ocean from June 5 to 14, but small schools were noted at times before and after those dates. Terns were in attendance in great numbers.

Catches were light until July 1, when the trout became active, continuing so until early August. The trap did excellent service, although the heavy rains of early July interfered materially with fishing, as refuse drifted against the wire netting, making it impossible at times to hold the netting across the stream at the bottom. Fair success was experienced with drift nets in the evenings during darkness. Trips were made also to all tributary streams and fish were driven down into fyke or gill nets near the stream mouths. These results were satisfactory.

The first red salmon reached the camp June 30, but they did not interfere with operations before July 13, although they were in the lower lake in enormous schools. On their arrival in numbers sufficient to offer interference barrier and trap were removed and fishing was conducted exclusively with bait trap and set and hand lines.

At the season's close the equipment was overhauled and stored at the cannery of the Red Salmon Canning Co., Ugashik, and the patrol launch at the Alaska Packers Association cannery at the same point. The crew proceeded to the States on the Alaska Packers Association ship *Star of Zealand*, after being transferred to that vessel by the *Margaret* of the Naknek Packing Co.

The number of fish taken aggregated 8,946 and weighed 22,365 pounds, an average of 2½ pounds each. About 80 per cent were Dolly Vardens and the remainder lake and rainbow trouts. Some whitefish and grayling were taken, but in negligible numbers.

Nushagak.—This crew was in charge of Eric Fenno and embarked on the Columbia River Packers' Association ship *St. Nicholas*, from Astoria, Oreg., April 19, arriving at Nushagak May 18. A small launch, which was transported on the *St. Nicholas*, was used by the crew to make the trip to Snag Point.

Until supplies were unloaded from the *Burgess*, the crew busied themselves in overhauling equipment and boats. The latter were placed in the water so that seams could be properly swollen to stop leakage. When this work was completed and supplies were available, the crew started up river with two loaded dories in tow by patrol boat *No. 3*.

Camp was established June 3 at the head of the first lake, and fishing progressed with but meager results to June 12, when catches began to improve. The greatest success was experienced with set nets, which were transferred from place to place, those on the side of the river toward the lake outlet making the best catches. No large schools of trout were noted at any time. Numbers were observed passing up stream with the salmon, however, and it was concluded that they were going up immediately on arrival from salt water.

About the time it became necessary to break camp trout were arriving in greater numbers than at any other period. A run arrived from salt water August 1, and several successful hauls were made with the seine. The sizes show a decided decrease each year, from an average of 4 pounds in 1920 and 3½ pounds in 1921 to 2½ pounds the current year. A few specimens weighing 7 pounds were taken through the season. In former years this size was common.

Schools of migrating salmon were seen passing down at intervals but never in large numbers. The action of the terns gave positive evidence when a school was passing. An intermission in the tern depredations was noticeable from June 18 to 23, and no migrations were reported during that period. The last migrations reported were on July 27, and all the terns disappeared from the lake on July 29. Several trips were made to all islands in the lake for the purpose of destroying tern eggs. On trips of observation to the second lake, terns were seen working the entire river.

Incoming salmon made their appearance at the operating point near the river's outlet on July 2, necessitating the removal of nets at that point, after which set and hand lines were used here. At other points the nets were fished with success to July 9, when the salmon began scattering over the entire territory. For a few days during the early part of the run the salmon passed up in continuous schools, which soon declined to small numbers of from 20 to 30 passing at intervals with long periods between.

Gill-net marked fish, although noticeable all through the run, were not seen in large numbers before the middle of July, when the ratio of fish badly injured reached about 10 per cent, and a few days later, as the run slackened, 25 per cent. July 21 most of the salmon noted ascending and endeavoring to ascend were injured and sick. Many of these, however, were fish that for some time had endeavored to ascend, but without success, and would perish in any case before spawning.

Humpback-salmon spawning was in progress near the outlet of the lower lake when the crew departed on August 9, but not in large numbers.

The total take of trout for the season was 7,410 fish, weighing 18,525 pounds, an average of 2½ pounds each. Ninety-five per cent were Dolly Vardens, the remainder being pike with a few rainbow trout.

Equipment with one small launch was stored at the Alaska-Portland Packers' Association cannery at Snag Point, and the launch *Scoter* and patrol boat *No. 3* were placed on the ways of the Alaska Packers Association cannery

at the same place. The return trip was made on the Columbia River Packers' Association ship *St. Nicholas*.

Iliamna.—The writer and an assistant left Seattle April 15 by regular passenger vessel for Anchorage and proceeded thence down Cook Inlet by launch to Iliamna Bay, and from that point over the divide to Iliamna Village on snowshoes, arriving May 2.

Ice still covered the lake, but was not safe for travel. Many of the streams, however, were entirely free of ice. On May 6 a trip was made up Iliamna River about 6 miles. The water was clear, and not over a dozen trout were noted in the entire stream. At this time the young salmon were emerging from the gravel, and small schools were seen at certain points along the stream descending slowly to the lake. No trout have gathered in any numbers in this river since 1920.

A trip was made to Pile Bay on May 8. Five native women were fishing through holes in the ice in about 4 feet of water, using black thread for line and preserved fish eggs for bait. One woman caught 21 fish and the others from 8 to 16 each, all Dolly Vardens, weighing a pound apiece. It is the practice of natives to fish in this manner through the late winter and spring, when weather and ice conditions permit, and the women's catch on this date was a fair average of their usual take.

On the occasion of this visit of the crew the ice on the lake was so dangerous that no work could be attempted. Another trip was made up the Iliamna River and several nets set at advantageous points to determine whether trout were moving. The nets were fished with negligible results for a few days, when the ice broke sufficiently to permit passage across the lake.

On May 18 the crew proceeded down river with a load of equipment and met O. B. Millett with his launch at Fish Village, where they were forced to seek shelter with the smaller boat. They were taken in tow and arrived at Goose Bay in the evening. The bureau's launch had been on the ways here through the winter in care of Mr. Millett and was overhauled, painted, and ready to be placed in the water before the crew's arrival.

After the launch was sufficiently long in the water to stop leakage equipment was taken aboard and the season's work was begun. Nets were placed across the mouth of Goose Bay, and although some miscellaneous species of fish were taken, among which were Dolly Vardens, rainbow trout, whitefish, and grayling, the catches were very small. Trips were made to the surrounding creeks. At each point, the spawning grounds, where young salmon were emerging from the gravel, were visited. Large schools of fry were noted in all the tributary creeks and spring ponds, but few had as yet reached the main creek in their descent to the lake. When inspecting this section last fall during the spawning period a fair run was noted in the spring ponds, and the crew were advised that the run continued very late and that live spawning fish were seen January 6.

Fishbones piled at different points along the shore—the work of bears—testified to a good run. The natives' popular method of hunting bears is to have roosts in the tree tops along the shore line, where they lie in wait for the bears, the fish being the bait to attract them. Several were killed from these roosts last year.

The entire section was prospected for trout, but very few were caught. It became evident that they were not in the streams or in that vicinity, so equipment was transferred to Woody Island, at the upper end of Iliamna Lake, the object being to locate trout in connection with the salmon spawning grounds and the presence of salmon fry. Very little is known of this island, but upon investigation it was found to contain several series of connecting lakes, with the entrance to each series from the main lake and deep enough to accommodate patrol boat *No. 1*. Young salmon were noticed in considerable schools feeding along the shores. Nets were set around some of the schools, and an excellent catch of trout during the night was the result.

Most of the catch during the season was made in this district. When fishing became unprofitable in one series of lakes, camp was changed to another. The employees lived aboard the launch, which facilitated their movements. The first salmon made their appearance on July 3, and at this time trout were becoming scarce, so operations were transferred to the southeastern part of the lake in the vicinity of Intricate Bay. This was an excellent place for the work, but the salmon appeared in such numbers as to make extensive fishing impossible. Enough information was gathered, however, to show the necessity of a season's aggressive operations in that locality. Another year

it is the intention to place a crew of residents on patrol boat *No. 1*, which was left on the ways at the head of the lake, and proceed immediately after the break-up to Intricate Bay, where operations will be begun.

Sufficient equipment and mess supplies were stored at Iliamna for work next year in this sector. One of the smaller patrol boats is to be dispatched with a crew from Naknek to undertake operations at the lake outlet.

Considerable work was accomplished on the fishway at Kokhonak Falls. The grade was made easier, the passage wider, and a new resting pool added to the lower end of the passage, which now enables the salmon to get over the falls without obstruction. To complete these improvements several tons of rock were removed by blasting.

The total catch in this sector for the season was 3,697 fish weighing 9,242 pounds, an average of 2½ pounds each. Ninety per cent were Dolly Vardens, the remainder being lake and rainbow trouts and pike.

Upon completion of the work the launch and equipment were overhauled and the former was placed on the ways at Goose Bay, the latter stored at the home of O. B. Millett.

Predatory trout taken in 1922.

Location operated.	Fish taken.	Average weight.	Total weight.	Dolly Vardens.	Lake trout.	All others, steelhead, rainbow trout, and pike.
	Number.	*Pounds.*	*Pounds.*	*Per cent.*	*Per cent.*	*Per cent.*
Naknek	3,426	12	41,112	10	80	10
Egegik	10,063	4	40,252	100	.....	.....
Ugashik	8,946	2½	22,365	80	10	10
Nushagak	7,410	2½	18,525	95	.....	5
Iliamna	3,697	2½	9,242	90	5	5
Total	33,542	.....	131,496	.....	.....	.....

Recapitulation.—It is felt that the work of destroying predatory fish is showing results, as reduced numbers are encountered in streams that have been aggressively fished. This is very noticeable in Iliamna River and the upper portion of Iliamna Lake, also in certain creeks in Little Becharoff Lake, notably Kanatak Creek and vicinity. The work in this section proves also that a continuous war must be waged against the marauders.

Practically all the trout captured this year were large, fat, and sea-run. The majority taken in previous years had the appearance of being lake fish. Most of the fish captured through the entire season's operations were Dolly Varden trout.

The small trap installed this year at Ugashik as an experiment can be utilized with profit at Wood River and possibly other points where sea-run trout may be intercepted. It is cheap, efficient, easy to install, and, with slight changes as to leads and pots, can be made to fish both incoming and outgoing trout, the incoming feature to be removed as the salmon appear and the outgoing portion to remain efficiently operating for the migrations that occur through July at Ugashik. It is assumed that a like migration occurs at other lakes. The bureau is furnishing web for this purpose, and measurements of the width of the river at the lake outlet, together with water depths, are at hand.

Experiments were made with small-caliber shotguns (36 gauge) in making war on terns. Excellent execution was possible from the stern of the boat, as there are usually several birds following in the wake of each boat, picking up small fish that are worked to the water's edge by action of the propeller. The cost of the gun and ammunition is nominal, and the guns can be profitably utilized on all boats.

EXTENT OF SALMON RUNS.

There were approximately 1,500,000 cases of fish packed in Bristol Bay during the current year, of which about 70 per cent was reported for the east shore, including Kvichak, Naknek, Egegik, and Ugashik, and 30 per cent for the

west shore, including all of Nushagak. It is estimated that about 10 per cent of the Nushagak pack consisted of fish transferred from the east shore.

Along the east shore of Bristol Bay the red salmon made their appearance June 26, when small numbers were taken in the vicinity of Egegik. Fishing improved gradually to July 1, when the heavy rush set in. Purse seiners operating through this period made excellent catches about 25 miles offshore from Egegik. The number of fish increased so rapidly that practically all canneries in this section were compelled to raise their limit flags simultaneously. In the Naknek and Kvichak districts the run held from July 2 to 11, when a falling off was noticed and some limit flags were taken down. All flags were removed a few days later. After July 13 the run declined rapidly with occasional flashes to the 20th, after which fishermen for the most part lost interest. The Ugashik run held steadiest and continued strong to July 22. Fair numbers were entering to the end of July.

At Nushagak the main run of red salmon began July 3 and held steady until July 17, when it fell off to almost nothing. The run, however, was never heavy, and no cannery was driven to its limit, although operating on 80 per cent capacity. A small run of humpback salmon was reported July 20. At Igushik red salmon made their appearance July 5, the run reaching its crest the 8th, after which it tapered off rapidly, and after July 15 very few fish were noted. The run was never large even at its height.

In checking the salmon run at the outlet of the stream between Alegnagik and Nerka Lakes an estimate was made of about 500,000 salmon passing upstream. Some spawning is accomplished in Alegnagik, but it is negligible in comparison with the connecting series of lakes above.

No estimate was possible at the operating points along the east shore and none is necessary. The escapement was ample to meet every requirement for the perpetuity of the cycle. In many cases the fish were too numerous in the spawning beds for any results above normal seeding, especially in certain streams tributary to Iliamna Lake.

PATROL.

The patrol of the entire district was especially efficient. Six power boats and the vessel *Scoter* were used. Three 30-foot Columbia River type boats, each fitted with living accommodations for three men, were on hand from 1921, and three 28-foot boats of the Columbia River trolling type, powered with 5 and 6 horsepower engines, each fitted with living accommodations for two men, were available for this year's operations. These boats were used in connection with the predatory trout work and were placed on patrol when the fishing season began. It was thus possible to cover the entire field with suitable power boats to insure proper law enforcement. One boat with warden and assistant was assigned each to Wood, Nushagak, Igushik, Kvichak, Naknek, and Ugashik Rivers. Egegik was handled as previously, using an Evinrude motor and dory with perfect success. One of the boats was used the entire season for operations in Iliamna Lake.

The *Scoter* proved a welcome addition, making it possible to keep in touch with the different phases of the work at all times and to prosecute those on boats taken for violating fishery laws by transporting the commissioner and marshal to the points where the violations occurred.

The situation at Ugashik is bad. The fishermen refuse to remain below the markers unless absolutely compelled to. There are 15 miles of river above the markers to the Red Salmon Canning Co.'s cannery, and at times fishing boats were anchored at intervals along the entire distance. Although it is certain they were fishing and the method employed is known, positive evidence could not be procured, as the bureau's boat could be seen at a distance when it was impossible to see their nets in the water. A small piece of net is so drawn across the channel that it can easily be removed. In making the rounds with the warden the writer noted a fisherman 6 to 8 miles above the marker who supposedly had a net in the water, but just before his action could be seen he raised his sail. One boat after another followed his example until from 8 to 10 boats were sailing down the river ahead. The situation can be controlled by two boats, one to operate in the vicinity of the ships just above the markers and the other in the vicinity of the "chutes" and above, and this arrangement will be in force another year. Every effort was made to enforce the laws with the single patrol boat available, and as a result eight boats were apprehended. Fines were imposed in each case.

SPAWNING GROUNDS.

When work was completed in Bristol Bay and arrangements made for the return of the different crews to the States the writer proceeded to Iliamna Lake to view the spawning grounds in this section before departure for the States, in accordance with the custom of the two preceding years. All the spawning territory was visited and observations indicated a sufficient escapement to seed all available grounds. The tributary streams along the southeast, east, and north shore of Iliamna Lake contained surplus spawners to the extent, in many cases, of being wasteful from an economic standpoint. On the trip to and through the Lake Clark section great numbers of salmon, either spawning or spent, were noted along the entire Newhalen River, and extensive spawning was in progress along the shore of Lake Clark to Tarnalia. Fish seemed to be everywhere, and in localities where none were seen the two preceding years.

Visits were made in turn to Tarnalia River, Current Creek, and Big River; thence to the head of Little Lake Clark. Return was made along the opposite lake shore to Kegik Creek. Tazimina River was visited last. Trips were made upstream at each creek and river visited, but the discoloration of the streams caused by glacial water and floods precluded all possibility of intelligent observation, with the exception of Kegik Lake and Tazimina River. The trip was somewhat early for the run in the upper reaches of the lake, but red salmon were observed jumping at the entrance to Little Lake Clark.

From information obtained from reliable residents relative to last year's run in this section it was learned that "very few fish reached the upper portion of Little Lake Clark, and the only fish of consequence were noted in Kegik Lake, where fair numbers were seen earlier in the season. Signs of a few thousand fish were seen in the sloughs of Current Creek about 10 miles upriver, but the brown bears had cleared off every fish from their spawning beds," and it is felt that the results from spawning here were negligible. At Tarnalia, where great numbers were noted the present season and are numerous in all good years, "there were no dead fish found along the lake shore, where previously many were picked up for garden fertilizer." On arrival at Kegik on August 23 a trip was made to the lake, where several thousand red salmon were noted milling along the upper shores near the mouths of several small streams. All fish noted were silvery and fresh, as though they had just arrived, and no spawning was in progress. The same resident observers will report next spring on the extent of this year's run in Upper Lake Clark.

A survey was made of Tazimina River to the falls, and salmon were found in its entire length of about 8 miles. This fall is impassable, has a perpendicular drop of about 75 feet, and is about 50 feet wide. And on the date visited the stream was low, about 2 feet of water passing over. The rush upstream was under way in the river, and some spawning at various points was in progress. An unbroken line of fish from 1 to 3 feet wide was passing near the river mouth, with seemingly no limit to the numbers.

The natives had their winter's supply cured, and it is estimated that about 60,000 fish, divided between 30 families, was their Lake Clark quota. About 50,000 fish would be required for the local families around Iliamna Lake.

On the return to Iliamna on August 28 supplies were taken aboard preparatory to an inspection around the lake. Each stream of consequence was visited and examined upriver several miles. The Upper Tularic was visited late in the season, but is not considered of importance as a salmon-spawning stream, although it had the appearance of being thoroughly suitable for the purpose. It was estimated that not over 10,000 fish spawned in its waters. An abundance of spawners was noted along the lake shore in every direction, and the lake surface was generously dotted with the dead fish after spawning.

Visits were made to Chekok Creek and tributaries, and many thousand salmon were seen on the spawning beds and schooling preparatory to spawning. In one spring pond, 350 feet long by 40 feet wide and 6 to 8 inches deep, it was estimated that there were about 5,600 fish in course of spawning and fully as many more in pools outside in the creek schooling and ready to enter. This pool is fed by springs and never freezes. The bottom was pure, coarse, clear gravel down as far as dug. The fish were not working as actively as in a flowing stream. In the course of digging it was noted that about 25 per cent of the eggs among the gravel were dead, due to the activities of the late

arrivals. No trout or birds were in evidence. The tenure of life of spawning fish seemed to be prolonged in this water, and the dead were not decaying as rapidly as those in the creek beds. Other spring ponds not as suitable were supplied to capacity with spawners and many far beyond that point. In one pond, 150 feet long by 50 feet wide and 18 inches deep, there were estimated to be about 2,000 fish either dead or spawning. The bottom was literally covered with dead eggs; but few live ones were noted, and they would all eventually be picked up by the numerous gulls. Many more fish were schooling in the creek outside destined to the spring ponds.

At Copper River, August 29, it was estimated that there were about three times as many fish in the stream as were observed last year, possibly at least 1,000,000 fish in this river. The entire river bottom was dug over, and from the number of dead noticed it was concluded that one run had spawned. Another run was then on the beds, and sufficient numbers to cover this spawning territory a third time to capacity were yet in large schools, finning and milling in every eddy and deep pool.

Many sloughs in which extensive spawning was accomplished before the lowering of the stream were dry or nearly dry, and many that were separated from the main stream in which spawning was yet in force would be dry eventually. These formed serious losses, as the river was due to drop considably and continue extremely low throughout the winter months. Many nests in sloughs, entirely separated from the river, were dug up and both live and dead eggs found in about equal proportion.

Large losses of eggs have also occurred from rotational spawning on the same grounds, one set of spawners beginning after the first set is through. While watching the spawning riffles in the main river white eggs were seen at times drifting in a steady flow with the current. These were eggs dug up by the latest spawners and were a total loss. It was judged that about one-third of the number of spawners in this stream would bring maximum efficiency.

The number of fish at Kokhonak River was slightly larger than last year; possibly 2,000 were seen below the falls. The salmon were not active in the fishway on August 31 at the date of the inspection. With the improvements made to the fishway no trouble is experienced in their ascent over the falls.

The party followed the river to Kokhonak Lake, a very extensive body of water that has the appearance of being ideal for salmon and is connected with numerous smaller lakes and ponds of more or less value to salmon. The river is about 8 miles long and has four series of falls, each, with the exception of the falls near the river mouth, followed by rapids several hundred yards in length. No. 1 series of falls at the river mouth is about 20 feet high, over which the fishway is blasted, and is the most severe. No. 2 series, about 5 miles above that point, passes through three openings between high rock bluffs and is about 5 feet high. No. 3, a quarter of a mile above, passes through two openings between rock bowlders. No trouble is anticipated for the fish negotiating these natural obstacles. No. 4 is a serious obstruction for salmon. These falls are about 1 mile below the lake. The river passes through two entrances between rock ledges, and the fall is about 15 feet. There are three shelves over which the water flows, and it is doubtful if any salmon are able to pass over. Attention will be centered on this barrier another year.

The conditions at Kokhonak Creek were very similar to those experienced in Copper River, with an equal surplus of spawners and a like loss of eggs from overseeding.

The numbers of salmon entering Belinda Creek were about equal to those entering in 1921, and very few were taken by the natives at that point for home consumption. Early in the season great numbers were seen schooling near the creek mouth, but evidently the main body passed up the lake to other streams or scattered along the lake shore to deposit their eggs.

The fact is emphasized that this season was exceptional, and although it is felt that the corresponding cycle will bring results fully on a par with this year, no absolute reliance can be placed on the return of the next two years. Following that period a substantial improvement may be looked for all along the line. It is felt that the extermination of the predatory enemies of salmon is the most important work that can be accomplished toward salmon conservation and that the results much more than warrant the expenditures made.

WOOD RIVER LAKE SYSTEM.

Warden A. T. Looff and one assistant remained in the district during the winter of 1922–23 to make a survey of the spawning grounds of the Wood River lake system. The following report was submitted by Mr. Looff as a result of observations before the freeze up in the fall.

GENERAL REPORT OF SEASON'S OPERATIONS.

During the fall of 1922 an examination was made of the Wood River system to determine the extent of its fishery waters. All of the spawning areas were inspected and the number of salmon on the beds estimated. All tributaries were examined for obstructions to the ascent of salmon. The principal breeding grounds of the predatory tern were located, and a study was made of the spawning habits of Dolly Varden trout in this district.

The Wood River watershed consists of the 5 Wood River lakes, namely Aleknagik, Nerka, Beverly, Fourth, and Kulik, together with their connecting rivers, 5 small tributary lakes, and 55 tributary streams. The whole is drained by Wood River into Bristol Bay.

Leaving Snag Point August 23 the party proceeded up Wood River to Aleknagik Lake, thence to Nerka, Beverly, Fourth, and Kulik Lakes. Patrol boat *No. 4* was used for the run up Wood River and the work on Aleknagik Lake. An 18-foot codfish dory was used on the upper lakes. No difficulty was experienced in ascending and descending the connecting rivers. Each lake was circled and the entire shore line examined. All tributary lakes and streams were studied, and those frequented by salmon or other fish were explored. Work was completed and return made to winter quarters at Snag Point on October 9, camp having been established 19 times, and about 525 miles, 400 of which were rowed in a dory, having been covered.

Aleknagik Lake.—Aleknagik Lake is about 16 miles in length, has an average width of about 3½ miles, and lies southeast and northwest. In the lake are 15 islands, 4 of which are important breeding grounds of gull and tern. Besides the connecting river coming down from Lake Nerka, nine tributary streams enter the lake, one of which drains a small tributary lake. Five of the tributaries are entered by salmon.

Creek No. 1 enters the lake on the southeast shore about 3 miles above the outlet of the lake. It is 2 miles in length and heads in a small lake one-half mile long and one-third mile wide. About 5,000 red salmon spawned in the stream and lake. It was examined July 28 and September 25 and 29. Later, while working on this stream in connection with Dolly Varden trout operations, a number of coho salmon were seen ascending.

Creek No. 2 enters the lake one-half mile northwest of creek No. 1. It is small, 1 mile in length, and heads in the tundra. However, 50 red salmon spawned in the stream, and one nest in only 2 inches of water was marked for winter examination.

Creek No. 3 enters the lake on the northeast shore behind the large island near the lake outlet. Its length is 1 mile, and it heads in the tundra. A native reported that red salmon enter this stream, but no salmon were found there.

Bear Creek enters Bear Bay on the southwest shore about 6 miles above the outlet of the lake. It is a fair-sized stream 5 miles in length and heads in the mountains to the southwest. The stream was examined on July 28 and September 27 throughout its entire length for obstructions and Dolly Varden trout. Salmon were found 3 miles above the mouth, and it was estimated that 5,000 red salmon spawned in its waters.

Creek No. 4 is a branch of Bear Creek. It is one-half mile in length and heads in the tundra to the west. Twenty red salmon spawned in this little stream.

Creek No. 5 enters the lake on the southwest shore about halfway up the lake. It is the largest tributary and should really be classed as a mountain river. It is 8 miles in length and rises in the mountains to the south. It was examined July 28 and October 5. Salmon spawned 3 miles above the mouth, and it was estimated that the stream contained 4,000 red salmon.

Stormy Creek enters the lake on the southwest shore near the head of the lake. It is a mountain stream 2 miles in length and has no salmon.

Creek No. 6 enters the head of the lake. It is 4 miles in length and has its source in the marshy country to the northwest. Natives stated that salmon spawn in this stream, but none was found.

Of the shore line of Aleknagik Lake proper about 10 miles is suitable for spawning. It was estimated that 18,000 red salmon spawned along the lake shore in areas the total length of which is 5½ miles.

The river connecting Nerka and Aleknagik Lakes is 4½ miles in length and flows generally south. It was examined August 25 and September 16. Salmon were spawning in the river throughout its entire length, and it was estimated that it contained 5,000 red salmon.

Nerka Lake.—Nerka Lake is the largest of the Wood River lakes. It lies like a great horseshoe with the opening toward the east. The shortest route from outlet to head is fully 45 miles. In circling this lake the distance traveled is estimated at 160 miles, not counting side trips up tributaries. In the lake are 26 islands, of which three are grass islands and showed evidence of being vast breeding grounds of gull and tern. Twenty-three tributaries enter the lake, four of which have their origin in tributary lakes. Eight tributaries are entered by salmon.

Creek No. 7 enters the lake on the southeast shore about one-half mile above the outlet. It is a mountain stream 2 miles in length and contained no salmon.

Creek No. 8 enters the lake on the southeast shore about 1 mile above the outlet. Length 2 miles, source mountain, no salmon.

Creek No. 9 enters the southeast shore about 5 miles above the lake outlet. Length 3 miles, source low hills, no salmon.

Creek No. 10 enters the lake on the east shore about 15 miles above the lake outlet. This stream is 3 miles in length. At its head is a small lake 1 mile long and one-half mile wide. The lake and stream have good gravel. The estimate for both was 5,000 red salmon. Examined August 26 and September 15.

Creek No. 11 enters the lake on the east shore 18 miles below the head of the lake. Length 1 mile, source mountain, no salmon.

Creek No. 12 enters the west arm of the big bay on the east shore of the lake, is 1 mile long, and heads on the mountain side. Over 50 red salmon were spawning in this little creek. Examined August 28.

Creek No. 13 enters the east arm of the big bay on the east shore of the lake. Length 1 mile, source low hills, no salmon.

Creek No. 14 enters on the northwest shore 3 miles below the head of the lake. Length 1½ miles, source low hills, no salmon.

Creek No. 15 enters on the northwest shore 9 miles below the head of the lake. Length 3 miles, source mountain, no salmon. This stream has good gravel for a distance of one-half mile above the mouth.

Creek No. 16 enters on the northwest shore 13 miles below the head of the lake. Length 3 miles, source mountain valley, no salmon.

Creek No. 17 enters the bay formed by the long peninsula on the northwest shore of the lake. This stream is 3½ miles in length and drains a small mountain valley, is 8 to 10 feet in width, and has an average depth of 2 feet. For a distance of 2 miles above the mouth the bottom is thoroughly suitable for spawning. Here over 50 red salmon were counted. The season was well advanced. Examined September 11.

Creek No. 18 enters the same bay one-fourth mile southwest of Creek No. 17. The stream is 4 miles in length and drains a mountain valley. Its bottom is suitable for spawning for a distance of 1 mile above the mouth. One hundred and fifty red salmon were counted here. Examined September 11.

Creeks Nos. 19 and 20 are short mountain creeks that enter the arm on its north shore. They are each one-half mile long and have no salmon.

Creek No. 21 enters the head of the northwest arm of the lake. This is Nerka's largest tributary. Length 8 miles, average width 20 feet, depth 3 feet. Origin is in the mountains to the northwest. There is good gravel for a distance of 5 miles up this stream. It was estimated that not less than 8,000 red salmon were spawning in this stream. Examined September 12.

Creek No. 22 enters near the entrance of the arm on the south side. This is Nerka's third largest tributary. Length 4 miles, origin in the mountain valley leading to the west. This stream contains good gravel. Estimate for the stream was 1,000 red salmon. Examined September 12 and 13.

Little Togiak River connects Little Togiak Lake with Nerka Lake. The river is only 500 yards long, and it was an easy matter to pole a boat up into Little Togiak Lake. The lake is 8 miles in length and 1½ miles in width. The shore

line is not attractive as a spawning area, the water being shallow and the bottom covered largely with rocks. At the head of the lake, however, is a small area with good gravel, and here were 2,500 red salmon. In Little Togiak River were about 500 spawning red salmon. Examined September 14.

Creek No. 23 is a small mountain stream entering the head of Little Togiak Lake. Its length is 2 miles, and salmon do not ascend.

Creek No. 24 enters on the southwest shore of the lake 1 mile southeast of the outlet of Little Togiak River, is one-third mile in length, and drains a small lake 1 mile long and one-fourth mile wide. The creek is small and the lake shallow. Salmon do not enter.

Creek No. 25 enters on the southwest shore of the lake 1½ miles southeast of the outlet of Little Togiak River, is 2 miles long, and drains a small lake one-half mile in diameter. Stream and lake have good gravel, and salmon were spawning in both. Estimated to contain 1,000 red salmon. Examined September 13.

Creeks Nos. 26, 27, and 28 enter along the southwest shore of the lake. They are short, draining mountain ravines, and are entirely unsuitable for spawning.

Of the 160 miles of shore line of Lake Nerka proper, 90 miles is suitable for spawning. Salmon were spawning in 20 distinct areas with a total length of 22 miles. The areas are well distributed around the lake, most of them centering at the mouths of tributary streams. Salmon were most abundant in two areas, one on each side of the long peninsula on the northwest shore of the lake, but were certainly not crowded. It was estimated that the lake-shore spawning areas totaled 31,000 red salmon.

The river connecting Beverly Lake with Nerka Lake is 2 miles long and flows south. This was found to be the most difficult of ascent of the four connecting rivers. The water is swift and the channel strewn with large bowlders, which makes the river unsuitable for spawning. While ascending the river August 29 thousands of salmon were seen in the eddies. They seemed weak, and upon examination were found to have spawned. While descending the river September 8 fully 30,000 dead and dying salmon were found along the shores and in the eddies. Several hundred of the dead fish were examined. All were spawned out. They did not spawn in the river, but must have spawned along the shores of Lake Beverly above, and upon becoming weak dropped back into the river, where the swift rapids made short work of them.

Beverly Lake.—Beverly Lake is the second largest of the Wood River lakes, with a length of about 20 miles and an average width of 4 miles. From the outlet to inlet the direction is west-northwest. In the lake are four islands. All are rocky, and gulls and terns do not nest on them. Twelve tributary streams enter the lake, of which three are ascended by salmon. A brief description of the tributaries follows:

Creeks Nos. 29, 30, 31, 32, and 33 are small streams that enter the lake along the north shore. Salmon do not ascend any of them, although Nos. 30 and 31 have small patches of good gravel. The creeks all head in the low timbered country to the north of the lake.

Creek No. 34 enters the head of the bay on the north shore of the lake about 7 miles below the mouth of the river coming down from Fourth Lake. Length, 1 mile; source, tundra; no salmon.

Creek No. 35 enters on the north shore of the lake about 4 miles below the outlet of the river coming down from Fourth Lake. Its length is 1½ miles. The stream has good gravel bottom and drains a small mountain valley, but salmon do not enter.

Creek No. 36 enters on the north shore of the lake about 2 miles below the outlet of the river coming down from Fourth Lake. This stream drains a small mountain valley and is 2 miles long. It has good gravel bottom for a distance of one-half mile above the mouth, and 500 red salmon were spawning here. Examined August 30 and 31.

Creek No. 37 enters the lake one-half mile south of the outlet of the river coming down from Fourth Lake, is 1 mile long, and has its source at the base of a large mountain to the west. It has good gravel, but salmon do not ascend.

Creek No. 38 enters the head of the north arm on the upper end of the lake. This is Beverly's largest tributary with a length of 4 miles and an average width of 15 feet. The stream drains a mountain valley. The water in the lower 2 miles flows slowly with an average depth of 3 feet. Five thousand red salmon spawned here. Examined September 5.

Creek No. 39 enters the head of the south arm on the upper end of the lake. This is a small mountain stream 1 mile long and has no salmon.

Creek No. 40 is a small mountain creek, one-half mile long, that enters the bay on the south shore of the lake. Twenty red salmon were counted. Examined September 7.

Creek No. 41 is a small stream that enters on the south shore near the outlet of the lake. Length 2 miles, source low hills, no salmon.

Beverly Lake has a total shore line of 45 miles, of which 12 miles is thoroughly suitable for spawning purposes. Salmon were spawning in four distinct areas having a total length of 7 miles. Estimates of salmon spawning in lake-shore areas total 34,000. If to this be added the 30,000 dead and dying salmon seen in the river below, which it is believed spawned in the lake, more than twice as many red salmon spawned in Beverly Lake as in any one of the four other lakes. In the lower end of the lake and along most of the north shore the water is shallow and the bottom covered with grass and mud, altogether unsuitable for spawning. Along most of the south shore is good gravel, but large sections of it are covered with a brown slime. Examined August 29, 30, and 31, and September 5, 6, 7, and 8.

The river connecting Fourth Lake with Beverly Lake is 2½ miles long and averages 200 feet in width. Leaving Fourth Lake the river flows southeast. Just before entering Beverly Lake it swings southwest and then back to southeast. It was easy to pole a boat up. The entire length offers splendid spawning gravel, and salmon were spawning all along. It was estimated that 15,000 red salmon were spawning in the river. Examined September 1 and 5.

Fourth Lake.—Fourth Lake is 2 miles long and 1 mile wide. Excepting for the deep narrow gorge at the head where the river enters and the gorge at the outlet where the river flows out, this tiny lake is entirely surrounded by steep and high mountains rising from the very water's edge. The lake has no other tributaries and no islands. Along the shore line of the left limit is no spawning area, the water being extremely deep close up to the shore. Along the right limit the water is also very deep, but in places there is a narrow shelf of gravel where 1,000 red salmon were found spawning. At the upper end of the lake the river coming down from Kulik Lake has formed a gravel delta one-fourth mile in diameter. This was almost one continuous spawning nest, and it was estimated that 10,000 red salmon were spawning here. Contrary to findings in the three lower lakes the spawning period was apparently just beginning. The salmon were in fine condition. Examined September 1, 4, and 5.

The river connecting Kulik Lake with Fourth Lake is 3½ miles long and flows south-southeast. There are several rapids in the river and in places the stream breaks up into separate channels. The boat was lined up in five hours. Parts of the river have good gravel, but the water is mostly too swift for spawning. Very few salmon were seen in the river, and such as were seen were ascending, judging from their fresh color. Examined September 1 and 5.

Kulik Lake.—Kulik Lake is the last of the Wood River lakes, or the first as the water flows, and is 18 miles long with an average width of 4 miles. From the outlet the lake leads northeast for the first 6 miles, then curves to the southeast for 10 miles, narrowing down at the head to a small arm 2 miles wide and 2 miles long leading east. In the lake is one large island covered with timber and unfit for breeding grounds of gull or tern. Ten tributary streams enter the lake, only one of which is ascended by salmon. A brief description of the tributaries follows:

Five small creeks enter along the south shore east of the outlet. All of them emerge from narrow mountain ravines and are altogether unfit for spawning. Another small creek enters the head of the lake coming out of the low timbered country to the east. This creek is 2 miles long and has some good gravel, but salmon do not enter.

Creek No. 42 is a large stream that enters on the north shore about 5 miles below the head of the lake. It is about 4 miles long and 10 feet wide, with a depth of 1½ feet. The bottom is good gravel for a distance of 2 miles above the mouth. Here were 5,000 red salmon in the height of their spawning period on September 2 and 3.

Creek No. 43 is a large stream on the north shore about 8 miles below the head of the lake. It is 4 miles long and has good gravel for a distance of 2 miles above the mouth, but salmon do not enter.

Creek No. 44 is a small creek that enters on the north shore 6 miles northeast of the lower end of the lake; length 2 miles; drains small mountain valley; unfit for spawning.

Creek No. 45 enters the west end of the lake, is 3 miles long, and has as its origin a small glacier. The bottom is good gravel, but salmon do not ascend.

Kulik Lake has a total shore line of 40 miles, of which 25 miles is suitable for spawning purposes. The east end and the west end of the lake are rocky, but along the north and south shores are fine areas of gravel. Salmon were spawning sparsely on nearly all suitable territory. Estimates for the lake shores total 21,000 red salmon, spawning over areas totaling 20 miles in length.

Summary.—All references herein are to red salmon unless otherwise specified, as very few of the other species enter the lakes in this district, and although they were found occasionally they have not been included in the estimates. During the late summer several thousand humpback salmon spawned in the upper part of Wood River and around the outlet of Aleknagik Lake. About 50 king salmon were spawning here during the same period. An occasional chum salmon was found—about 25 in all—along with the red salmon in Aleknagik, Nerka, and Beverly Lakes, but none was found in the two upper lakes. Several hundred coho salmon were spawning in Aleknagik Lake and its tributaries during the latter part of September and as late as October 9.

Throughout the work on the spawning areas careful check was made to determine the ratio of male salmon to female. The rich red color of the male makes it easy to distinguish him from the female. That this might work to the male's favor was realized, and tests were limited to conditions where there could be no mistake. As a result of these observations, dealing with thousands of salmon on many spawning areas in each of the lakes, it is believed that fully as many male red salmon were on the spawning grounds of the Wood River lakes as female red salmon.

The four rivers that connect the Wood River lakes with a total length of 12½ miles, although more or less difficult to ascend with a boat, offer no serious obstruction to the ascending salmon, unless they are badly fungused. Throughout the investigation wherever opportunity offered, which was often, dead salmon were examined. The number of dead salmon found that had not spawned was almost negligible. Such as were found were mostly fungused. That the fungus caused their premature end is certain, as the only places where they were found in any numbers was at the outlet of the rivers entering Aleknagik and Nerka Lakes. No fungused salmon were found in the three upper lakes.

The 17 tributaries frequented by salmon, although small, with a total spawning area insignificant as compared with the main lake areas, are all clear of obstructions and easily ascended by the salmon. All other tributaries that were at all suitable for spawning were examined for obstructions. In two fairly good streams log jams were removed, but as no salmon were at the base the work was of no benefit for this season at least.

On lake-shore areas the salmon were distributed over such a vast territory that the areas appeared almost deserted. Only in a few cases were salmon spawning in groups of any size. It was not an uncommon experience to row for 5 miles along a lake shore with splendid spawning gravel and not see a salmon. In two places where this condition prevailed the ruins of native villages were seen, both in Lake Beverly. As native villages in this section are always located with regard to the fish supply, thousands of salmon must have spawned there when the villages were populated—evidently not many years ago.

In arriving at an estimate of the number of salmon that spawned in the Wood River lake system each area was treated as a separate unit. In many cases figures represent actual count, particularly in tributary-stream and small lake-shore areas. In all cases careful count was kept of dead fish and backbones of dead fish scattered along the shores and on the lower lakes, where the spawning period was much further advanced than on the upper lakes. Where it was impossible to count the fish the number was estimated. Although the weather was exceptionally favorable during the examination it is realized that some fish may have been missed. Gulls surely consumed many and dragged the remains of others out of sight. The following facts seem certain: (1) Not less than 213,600 red salmon spawned in the Wood River lakes and their tributaries; and (2) whether 50,000 more than 213,600, or twice 213,600 spawned, there was room for 10 times the number that actually spawned.

PREDATORY FISH AND BIRDS.

Several agencies detrimental to salmon production in the district are of more or less importance. These are depredations by fish and birds on the salmon spawn and young, fishing for salmon on the spawning grounds by na-

tives, and possibly the action of ice on the spawn. The predatory fish of this district are lake trout, pike, and Dolly Varden trout, the last being by far the most abundant and therefore the worst.

Lake trout were found in small numbers with the salmon on the spawning beds in Fourth Lake and in the river connecting Fourth Lake with Beverly Lake, also around the outlet of Little Togiak River. The depredations of these trout on young salmon in several of the salmon streams of Bristol Bay are well known. Examination of the stomachs of several caught proved that they are also egg eaters of no mean ability. However, their number is very small here.

Pike are not plentiful, but a few were found in each of the lakes. They do not feed upon spawn, their food consisting of live fish. It is certain that they consume a large number of young salmon.

Of the depredations of Dolly Varden trout on both the salmon spawn and young the bureau has ample evidence. An effor was made to determine something as to their number, their activities in connection with the ascent and spawning of the salmon, where they congregate, and their spawning habits. While inspecting the spawning areas in the various lakes and their tributaries, a trout gill net was used in places where it could be done without injury to the salmon. Being egg eaters most of the trout would be found on the salmon spawning grounds during the spawning period. As all of the salmon spawning areas were examined, it is believed that a large part of the Dolly Varden trout of this district were seen. During the latter part of September and the first part of October, when the red-salmon spawning period was over, attention was given almost entirely to work on trout. During this time six trout gill nets, one fyke net, and one seine were operated. Young Dolly Varden trout between 4 and 6 inches in length were found during early October coming out of the small tributary lake that enters on the southwest shore of Aleknagik Lake. A fyke net was set in the stream below so as to catch all of them, but was only partly successful on account of drifting leaves, with which the streams are choked during this season of the year.

A fence of spruce trees constructed above the net was not effective, due to the great quantities of leaves. About 200 young trout were caught. During the red-salmon spawning period and after, thousands of Dolly Varden trout were found in the upper part of Wood River and in Aleknagik Lake. Ascending the system from Aleknagik Lake they were less and less numerous, until in Kulik Lake they were so scarce that only three or four were seen in the entire lake. Two places were found in the upper lakes that might be profitably fished—namely, at the outlet of Nerka Lake and at the outlet of Little Togiak River—where there were trout by hundreds but not by thousands as in the lower lake. Altogether 1,018 trout were caught and destroyed, all of which were examined. The following conclusions were noted in regard to trout:

There are more Dolly Varden trout in the upper part of Wood River and in Aleknagik Lake than in all the other lakes combined. During the salmon-spawning period the trout congregate on the salmon-spawning beds and feed on the spawn. After the salmon-spawning period is over the trout gather around the outlets of tributary streams where they feed on the bodies of spent salmon. Until October 9 about 5 per cent of the trout were ripe and spawning around the outlets of tributary streams, none of them having ascended the streams. All tributaries of Aleknagik Lake were examined in October, and it is certain that no trout had ascended any of them prior to October 9. The condition of the others would indicate their spawning period as ranging from probably November to some time in the spring, with the bulk of them to spawn during the winter months. From the presence of young trout in the tributary lakes it would seem that at least part of the trout ascend tributaries to spawn. An attempt will be made during the winter to determine whether trout ascend the tributaries later.

In this district there are many gulls and terns. Although all terns had left before the 1st of September great flocks of gulls remained around the spawning areas throughout the spawning period and after, until the "freeze up." That the gulls were feeding on spawn, where the salmon were spawning in shallow water, during the early part of the spawning period was plain. As the season advanced, however, it was noticed that they were feeding for the most part on the bodies of spent salmon. Of the menace of terns to young salmon nothing need be said in this report. Their favorite nesting grounds,

if not their only ones, are grass-covered islands. All of the 52 islands in the Wood River lakes were examined for breeding grounds of gulls and terns. Besides four islands in Aleknagik Lake already known, three islands in Nerka Lake showed evidence of having vast breeding grounds of both these predatory birds, and it is believed that a large part of the great flocks of terns that frequent this district during the spring and summer nest on these three islands, which are close together, and could be kept clear of eggs by two men during the nesting period.

FISHING ON SPAWNING GROUNDS.

Five native families fished for salmon on the spawning beds of Aleknagik Lake during the spawning period. There was no fishing on any of the other lakes. About 3,000 salmon were caught and dried, of which some were spent red salmon and some cohos. Three native families continued fishing in the lake after the red-salmon spawning period was past and until the first part of October, the last family leaving the lake on October 7. They operated a total of nine nets most of the time, which it was estimated caught over 1,000 Dolly Varden trout besides other fresh-water fish, all for food for themselves and their dogs.

ACTION OF ICE ON SALMON EGGS.

To determine the action of the winter ice on salmon eggs, several nests in shallow water near the lake shores were marked with poles for winter examination. During the fall water gages were placed in several of the lakes to register the rise or fall of the water. From August 23 to September 5, when it reached its lowest level, the water of the lakes fell 2 inches. From that date on the water rose steadily, until by October 21 it had reached a level 18 inches higher than on September 5. The shallowest spawning nest found on lake-shore areas was covered with 12 inches of water on August 26. As the height of the spawning period was during the lowest stages of the water, few of the spawning beds were covered with less than 2½ feet of water when the "freeze up" came on November 4. It is reported that the past fall has not been wet. The condition of eggs in tributary streams is not certain. The streams, being for the most part small and very short, reach a flood stage on rainy days, but fall again to a low level in a few hours. Several nests in 2 inches of water were marked and will be examined during the coming winter.

CONCLUSION.

In conclusion it may be stated that throughout the examination of the district natural conditions were found to be almost ideal for salmon production. All of the great spawning areas are easily accessible to the salmon. Although thousands of trout and terns still remain to menace the young, much benefit has resulted from the past three seasons of work toward their extermination. In the season just passed (1922) the spawning areas were almost destitute of breeding salmon. With continued work on predatory fish and birds, and an ample escapement of brood salmon, it would seem that the Wood River lake system should produce many times the number of red salmon it has in the past.

LAKE ALEKNAGIK INVESTIGATIONS.

In connection with recent studies of the Wood River region, it is believed that it will be of interest and value to publish a report of examinations of Lake Aleknagik and its tributaries that were made in 1908 and 1909 by Millard C. Marsh, then chief agent in the bureau's Alaska service. In 1908 Mr. Marsh was accompanied by Claudius Wallich, field superintendent, specially detailed for the trip, and the period from May 31 to August 9 of that year was spent on the lake. The following year, accompanied by J. A. Legge, of the Afognak hatchery, Mr. Marsh was on Lake Aleknagik from June 7 until August 8. The report on these explorations, which has recently been revised by Mr. Marsh, is as follows:

NOTES ON EXPLORATIONS OF LAKE ALEKNAGIK, ALASKA, ITS TRIBUTARIES, AND THE SALMON SPAWNING GROUNDS, IN 1908 AND 1909.

In 1908 the Bureau of Fisheries, jointly with two of the salmon-packing companies, began the series of annual counts of red salmon escaping up Wood River into Lake Aleknagik, in the Bristol Bay region of Alaska.[2] Incidental to this project the lake shores and the tributary streams were examined in some detail in relation to the spawning migration of the salmon and possible future salmon-hatching operations in the region. Many of the observations concern the physical conditions only, and the rather desultory notes are chiefly of local value, to be interpreted on the ground covered. The lake is the first of a chain comprising a spawning basin of great extent and carrying a large quota of spawning salmon, and itself receives, besides its main inlet, nearly 40 large and small creeks, most of which are typical spawning grounds, some of them suitable for hatchery sites. It is the nearest large field to the Nushagak region for the study of the spawning grounds and the spawning fish upon them. Since it is accessible to small craft from tidewater, it is the more available as a resource for hatchery operations. For prospectors in either field these notes are likely to be of some assistance. Claudius Wallich, at that time field superintendent, participated in 1908 in some of the trips up the lake and rendered valuable assistance.

The foot of Lake Aleknagik consists of a nearly circular body of water about a mile in diameter. This is referred to throughout the text as the "lagoon." On its north shore is a native village. Its junction with the main body of the lake is marked by two distinct gravel spits making out from shore on either side. The distance between their tips was rather more than 200 yards, and it was here that the tally rack, through which the fish were made to pass for counting, was stretched in 1908 and 1909. This place was the base for the expeditions up the lake and the point of departure for the enumeration of the streams and all the observations.

There is, of course, great variation from year to year in the correlation of the calendar with the water temperature, the lake level, the disappearance of ice, the seasonal run-off, etc. Besides the observations recorded for particular creeks the following few notes and readings were made for the lake itself: Temperature at surface—June 7, 1909, 1 mile above lagoon, 9.30 a. m., 38° F. (head of Nushagak Bay, 44.5° F.); June 16, 1909, head of lagoon, 39.5° F. Lake level, 1909—highest seasonal level at lagoon June 19, when it was 20 inches above the level of June 7. The fall, beginning June 21, was about 41 inches during the next 49 days, when observations ceased. The tidal influence affected the lagoon level (June 7) not more than 1 to 3 inches. The current at the site of the rack at this date was 1.6 miles per hour. Several soundings were made in the lake, the deepest of which was 57 fathoms.

The earliest record is of May 31, 1908. Ice was encountered about 1 mile above the lagoon. As far as could be seen it covered the whole of the rest of the lake as a continuous sheet only a few inches thick and much honeycombed. It would bear no one's weight and was easily broken up, but only a large vessel could have made way through it. Many wet places could be seen indicating cracks through which water welled up on the ice. On June 12 of the same year the lake was open to the main inlet and carried a small amount of drift ice. From the inlet to the head of the lake the thin sheet of honeycomb ice still persisted.

Only a few tributaries to the lake can be recognized from craft traversing the lake without following closely the shore. Thus, the map of the lake appearing on page 200 in Bulletin of the United States Fish Commission for 1901[3] showed but 9 of the 36 streams here recorded as flowing into the lake, the majority of which carry at least some salmon and constitute spawning grounds. There are many tributaries unsuspected until the observer approaches within a few yards of their mouths. Probably there remain a few still unnoticed.

As most of the creeks are not named and as any value of the observations depends on identifying them they have been numbered. A few have been named. The exact dates are usually given as of use in comparing the two

[2] Excepting the interruption of one season (1914), these yearly tallies were continued for 11 consecutive years.

[3] Alaska Salmon Investigations in 1900 and 1901, by Jefferson F. Moser. Bulletin U. S. Fish Commission, Vol. XXI, for 1901 (1902), pp. 173–398. Washington.

years and in correlating the spawning advance with the season. The consecutive series begins with the Village Creek at the Indian village. It proceeds thence westward along the north shore and continues completely around the lake.

Creek 1. Village Creek.—August 4, 1908. At the extreme foot of the lake, emptying at the native village. Examined for about 1 mile of meander without seeing a single salmon. About one-half mile from the village the creek has a considerable hill on the right bank, while the other side is low. About 100 yards above the hill the stream becomes wider (7 feet) and shallower. It has a good coarse gravel bottom, with larger stones and rocks and much moss. Many deadfalls and overhanging branches obstruct passage along the creek bed. Farther up are two low hills one on each side, where the creek could be dammed, though the valley between is 75 feet or more wide. This flat

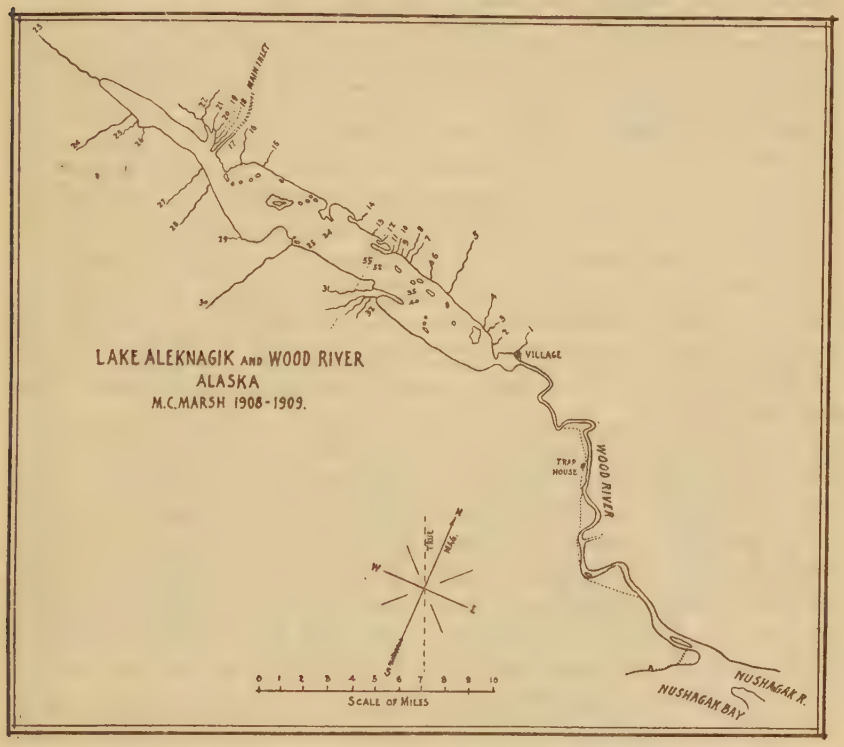


FIG. 6.—Lake Aleknagik and Wood River, Alaska.

is boggy and has a high, thick growth of grass. In and about this bog four-fifths of the volume of water originates. Several distinct channels rising in this soft mossy ground make into the main creek, which was followed up until it became scarcely a foot wide and was almost hidden by overhanging grass and vegetation. Here it ran between rather high banks. From the spring flats above mentioned the village was reached in a half hour of steady traveling.

The water of this creek is clear and cold, the bottom is favorable, its size is sufficient, and the gradient is easy, yet salmon do not enter it. There is a bar opposite its mouth and the water is shallow, but fish would have little trouble getting over it. The influence of the current of the creek is little felt where the salmon are passing up the lake, and they may not readily find it. Nevertheless, it is difficult to understand why it is entirely avoided. At this date, August 4, the salmon had been for some time entering the small streams. Its condition in winter is a question. A man who had wintered on the lake said it does not freeze and that the natives get water from it in the

winter. Probably at least a trickle of water remains, but it should not be regarded as a hatchery creek for several reasons.

Hundreds of redfish fry of the most recent hatch were seen opposite the village August 4. As they did not come from the village creek they may represent some lake spawning in the lagoon or possibly they had migrated from some distance.

Creek 2.—August 7, 1908. Around the first point from the lagoon, on the north shore. Small creek of brown water, too small for any use. Its course lies through a considerable low growth of willows. The bay off its mouth is at this date too shallow for the draft of a small launch.

Creek 3.—August 7, 1908. Opposite inner end of a small island. A small, unimportant creek of brown water. Temperature of the strait separating the island from mainland at this point, at 9.15 a. m., 52° F.

Creek 4.—August 7, 1908. A little west of No. 2. Temperature 45° F. About 1,000 spawning salmon were seen in less than a half mile of the meander. Many eggs were seen, and on a shallow riffle 22 fish were counted drifting by downstream during 10 minutes. The water was of a brownish color and considerably roiled, probably by salmon above. The gradient is very gradual, and there is no place for a dam, nor is it a good hatchery stream. Fifty salmon were seen crowded into one small hole, and many were schooling at the mouth.

Creek 5, North Shore Creek.—Opposite a point a little east of the tip of the high peninsula of the south shore. August 7, 1908, 12.30 p. m., temperature 52° F. It is 6 to 16 feet wide, with plenty of water, and carried some sediment, probably not produced by the salmon on the beds above. Near the mouth the stakes of a native barricade were seen. There were not many salmon off the mouth, and only 200 to 300 were seen in from 200 to 300 yards of stream. The bottom is of good gravel. A few redfish fry, the young of the season, and many small sculpins were seen. The banks are flat, and there is no place to dam. The creek comes from a valley between high mountains and may be many miles long, with possibly many salmon above. The estuary is broad and very shallow, and there is much uneven boggy ground around its mouth. The creek has seen very much higher water than the present stage. It is not a hatchery creek. Apparently there are fewer salmon in it than in much smaller creeks even 10 days earlier.

Creek 6, Spring Creek.—August 7, 1908. On the north shore about opposite the high peninsula of the south shore. The approaches were rather shallow, but a launch could get within 50 yards. The stream is about 1 mile long, with its source in a beautiful spring emerging from elevated mossy rocks, making immediately a gravelly pool about 60 feet in diameter. The temperature of the spring was 38° F. and of the outlet to the pool 45° F. The upper reaches to the creek are 20 feet or more wide and are very shallow, with blackish stones and gravel. Near the pool the gravel had a white tinge. The creek receives some small spring tributaries, including one spring pool large enough for salmon; but the large spring mentioned is the main source, and the volume of water is well maintained to this source. The rise is rapid enough for a gravity storage of water, but there is no very good place for a dam. It runs close to a hill at one point, but the banks are mostly low.

On August 7, 1908, there were many finely colored salmon in and off the very shallow mouth. All the salmon in the stream itself and in the two pools were counted:

Total dead	1,610
Total alive	2,800
Total entered creek to August 7	4,410

Shortly below the head spring a considerable reach of the stream had dead fish only.

The whole stream being accessible a complete census of spawners is possible. Two visits to this stream in 1909 enabled some comparisons. On August 1 of that year only 370 salmon had entered, of which 65 per cent were dead. The spring pool contained 46, all alive. An excess of males appeared, and nearly all fish were highly colored. The gulls had eaten the eyes and most of the flesh of the dead salmon. One week later (August 8) the total tally of salmon was 555, of which 71 per cent were dead. This is but 12½ per cent of the total that had entered the stream during the 1908 season up to August 7. In comparing these figures the great escapement for 1908, as shown at the tally rack, should be recalled.

Creeks 7 and 8.—On the north shore about 1 mile west of Creek 6. These are streams of size, the easternmost the larger, with their mouths only 200 yards apart. The two are of the same general character, with fine bottom for spawning beds and moderately rapid rise but no good places to dam nor good hatchery sites near the lake. They are probably long streams, with perhaps a common source farther inland. Heavy underbrush occurs all along the lake and the creeks in this region. Spawning salmon are apparently as abundant in proportion to size as in Creek 6, which is somewhat smaller.

Creeks 9 and 10.—These small creeks are a few hundred yards west of the preceding and one must steer close inshore to discover their existence. They are near the base of one of the several long, narrow crooked peninsulas that make out from the north shore and then bend and run parallel with the shore, inclosing long, narrow bays. The region about Creeks 9 and 10 is in a considerable bight. A few hundred salmon were seen in the larger of the two.

Creeks 11 and 12.—Creek 11 is a very small one on the neck of the peninsula referred to above and discharges into the bight. There may be another little creek on this neck nearer its base. In the bight is a secondary peninsula of the same shape as and lying similarly to the first, inclosing a secondary bight navigable for a small launch. Creek 12 discharges into this on the neck of the little peninsula. No live salmon were seen, but there were several dead stranded at its mouth. The neck of the larger peninsula is but a very few hundred yards wide. The lake could be seen across it from a boat at anchor in the head of the bight.

Creek 13.—A small stream about one-third of a mile west of Creek 12. It was not examined. A few salmon were seen near its mouth.

Creek 14.—August 8, 1908. This is at the head of a bight made by another small peninsula like those described above. It is small, with a mouth so shallow that salmon enter with difficulty. Fifty to one hundred had already entered and about a dozen were dead at the mouth, but no dead were seen in the creek. Only two or three live salmon were seen off the mouth. The stream has good bottom. It bifurcates a short distance up and can not be very large.

West of Creek 14 is another peninsula of irregular shape somewhat like a T. It has several small bays, which deliver no creeks. Several considerable schools of salmon turning red were seen hereabouts. From this peninsula westward for several miles there is fine gravel along the lake shore, but no creeks. A launch can skirt the shore very closely. Many large schools were seen, in total many thousands of salmon, and some of them miles from the nearest creek. They were not all in spawning color. The deep water in many places along here comes close to shore, which shelves off abruptly into 15 or 20 feet of water, in some places at an angle of nearly 45°. Often the bottom could not be seen at 30 feet from shore. Dead salmon were only occasional. Native drying racks were seen on shore, and the shelving bank and shore appeared good spawning ground. The salmon seen had mostly turned red, and it seems probable some may spawn here. Great schools, startled by the launch, would be seen for an instant as they shot away from shore into deeper water.

Creek 15.—This is a little creek on a gravel point that was covered with willow and alder. It has two mouths but is too small to carry salmon. There are four small islands near. Opposite the easternmost of these soundings showed 5¼ fathoms at 30 feet from shore and 15 fathoms at 100 feet.

At places between the mouths of Creeks 15 and 16 strands of long grass on the bottom of the lake showed the current was making gently toward the head instead of the foot of the lake.

Creek 16, Steep Creek.—August 8, 1908. It comes down from the west side of the highest and westernmost of the flat top range of mountains and is marked by the steepest gradient of all the tributaries of the lake. It affords favorable places for a dam, but the volume of water is too small to maintain a hatchery. Many salmon were present for so small a stream, and many eggs were seen in the water. Some distance up its temperature was 42° F. The shore region adjoining might furnish many spawning salmon. Between Creek 16 and the main inlet a sounding of 27 fathoms was made about 100 yards off the point making out from the north shore.

Creek 17, main inlet.—This stream drains the lakes above Aleknagik and is by far the largest of all the tributaries of the latter. On June 12, 1908, while ice still covered the lake west of the inlet, the flow in the latter was at a high stage, the current swift, and the water very clear. Only with difficulty could a boat have been pushed up the heavy riffles, which in places become rapids. Some drift ice was constantly passing. Two hours' walk up the trail

along its west side disclosed no falls nor cascades nor rise sufficient for a gravity supply of water. The lake near the inlet mouth had an excellent gravel shore with deep water. Many salmon bones lay in a windrow on the bottom 10 or 12 feet from shore. Many thousands of redfish fry, the young of the season with sacs but recently absorbed, were schooling along the beach close inshore. On July 27 of the same season these young fish were no longer to be seen.

The inshore gravel was bare from the fall of the lake level, and the bottom was algæ-covered. In the shore eddies of the inlet stream many ragged and tattered salmon were resting. Farther up a straggling procession, most of the fish still uncolored, was ascending. No ripe salmon were seen, and it seemed evident these fish were bound for the upper lakes and not to spawn in the inlet. On August 8 at the same point a similar procession, nearly all in red color, was still slowly passing at the rate of about 300 an hour. These were close inshore, and although the depth prevented seeing any fish beyond a few feet from shore they probably represented most of the run on the west side of the inlet at this date. They kept close in to avoid the current, like the ascending columns in Wood River. Certainly many of these migrating fish were bound for the upper lakes. There was no good evidence of spawning in the inlet.

In 1909 a few observations were repeated. July 1 there were no fry on the gravel beach where on June 12, 1908, they were in force. On July 23, however, they were again seen in numbers along the beach below the inlet. Some young of the season were seen July 1 up the inlet but no adults. July 23 the usual thin procession, with many gaps, was passing, and very few fish had turned red. The native drying racks had only green fish. Information from a native indicated that the inlet does not freeze over in winter, that considerable drift ice comes down, and that there are "plenty lakes" above. The lake surface July 1 registered a temperature of 42° F. at 7 p. m. A bench mark placed at this date showed on August 2 a fall of 21 inches for the lake level.

Padden Bay and its streams.—August 8, 1908. West of the inlet is a considerable indentation known locally as Padden Bay. The trend of its upper portion is NW. by W., of its lower or main portion about N. Five creeks (18–22) empty into it, only one of which is of importance.

Creek 18.—This is a small brown creek just inside the bay. There were about 100 salmon in its sluggish muddy estuary.

Creek 19.—A short distance beyond Creek 18 and of the same type. Many live salmon and many eggs on good gravel were seen in its mouth.

Creek 20.—Like the preceding. Fifty salmon were schooling off its mouth. Heavy underbrush impedes progress along the stream, which is close to the peninsula on which is located the cabin of the prospector whose name is given to the bay.

Creek 21.—A small brown creek, corresponding in position to Creek 22, each emptying on opposite sides of a little peninsula. There were many salmon about its mouth. Near by, among moss and plants, a lot of young pike (Esox) were seined. A small bight opposite the cabin may possibly contain another small creek.

Creek 22, Padden Creek.—July 27, 1908. This is the main stream of the bay and is indicated on Rodman's sketch map of 1900. No observations were made August 8. Above its long narrow estuary it meanders through tundra and is bordered by black birch and alder. Its width varies greatly, not exceeding 8 or 10 feet. It is shallow, reaching a depth of 2 feet where its coarse gravel is hollowed out by salmon. It has a moderate current with occasional riffles. It soon bifurcates, and the eastern branch trends toward the second lake. The salmon present were nearly all in deep red color, and many were spawning. The fish were evidently the first comers, marking the beginning of the spawning season here at a date when practically none of the salmon ascending the main inlet had turned in color. Mr. Wallich estimated the stream as capable of furnishing 12,000,000 to 15,000,000 eggs.

The courting fish, in fine spawning color, were here and there fluttering and fanning over the gravel. A pair seen at Chilkoot Lake in 1907 brought the actual spawning under better observation. The female had been fanning with her tail fin over a definite nest. The two fish approached each other and heading in the same direction lay parallel at the bottom of the nest with their sides in contact. At the same moment, while a convulsive fluttering shudder shook their whole bodies and the mouth of each fish distended widely, eggs and

milt were ejected, slightly clouding the water. The pair soon repeated this performance. The nest was then examined, and at first no eggs were seen. After picking away the stones at the bottom about two dozen eggs were found, presumably just extruded. Accompanying them were several large nematode worms which had been voided by the salmon. It appears that, at least on occasion, only a few eggs are spawned at the mating juncture, which must be frequently repeated.

Lake next above Aleknagik.—July 27. A more view of a portion of this lake was obtained. From the mouth of Creek 22 it was reached after an hour's walk over a fairly good old native trail. From the point where the trail meets the shore the lake is somewhat more than a mile wide and the trend of the 10 or 12 miles of water visible is apparently like that of Aleknagik. Opposite this shore of large uniform pebbles the water was very clear. A few salmon were obscurely seen near shore. The vicinity did not appear to be good spawning ground. Heavy shore growths came down close to the water. From Padden Bay to the head of the lake there are no streams.

Creek 23.—July 28, 1908. At the extreme head of Lake Aleknagik. This is one of its largest tributaries, though much smaller than the main inlet. Opposite its mouth a gravel bar rises abruptly from deep water and should be cautiously approached in power boats. The creek empties in two channels over shallow flats and wide reaching bars of gravel, sandy mud, or quicksand. Above the delta the mouth was about 75 feet wide. Its water was very clean and clear, with a temperature of 41° F. at 9 a. m., warming rapidly to 51° F. at noon of a hot day. The shallows near the mouth contained small schools of 2 to 15 red salmon fry.

A mile and a half of the creek showed an ordinary meander with swift current and excellent spawning bottom, the gravel getting coarser upstream. There were many willows and alders about the mouth and bordering the banks farther up. Pools and holes four to six feet deep occur. Salmon by hundreds in spawning color were seen migrating upstream, while few were making beds. In a small slough over a mile above the mouth a male humpback salmon was seen at the head of a school of 50 Dolly Varden trout and 2 red salmon. The stream is doubtless many miles long. It carries considerable drift timber, of which a large accumulation was cast up on the lake beach south of the mouth.

Creek 24, Wallich Creek.—This is the first stream on the south shore, about 2 miles below the head of the lake. It was first examined on July 28 by Mr. Wallich with a view to its value as a location for a hatchery. It is nearly as large as No. 23 and offers perhaps more advantages for the establishment and maintenance of a hatchery than any of the other streams. The estuary is long and shallow, with gravel bars. Along the lake shore on both sides of the mouth deep water comes within a few feet of shore, and a steamer could dock at a short wharf. A few hundred yards to the west of the mouth at 30 feet from shore the water was 6 feet deep. It is moreover convenient to the head of the lake and to Creeks 22 and 23 for supplementary egg supplies. On the lake front west of the stream is a tundra-covered plateau, with thin spruce woods, rising quite abruptly from the flats of the creek and bordering these upstream.

In the first half mile the stream is from 15 to 60 feet wide and has excellent gravel beds. About 300 or 400 yards above the mouth there is an island between 500 and 600 feet long. From the upper end of this island to the mouth of the creek the levelings made indicated a fall of at least 16 feet. Several feet of this fall occur in the reach along the island. The plateau passes along the lesser channel opposite the island, standing 10 or 12 feet above the creek bed. This high ground slopes down somewhat at each end of the island to the creek flats, maintaining itself at the lower end as a low, abrupt ridge 4 or 5 feet above the flats. The upper end of the island is apparently the best place to dam the stream From here a flume could be buried by grading along the face of the bluff on the west shore and led to the lake front not far from the creek mouth. Here a hatchery could be placed above the highest lake level and low enough to receive water taken from the creek at the upper end of the island.

On August 8, 1908, and August 2 and 8, 1909, the salmon in the stream below the first bend above the island were counted and estimated. The result indicated at least 500 to 600 on each date, besides a few dead. Thermometer readings showed water temperatures between 45° and 52° F. Observations of the water level in the creek at the upper end of the island showed in 1909 a

fall of 4¼ inches between July 23 and August 2. On August 8, 1½ inches had been recovered from the heavy rains of the day. July 1, 1909, it had fallen at least 2 feet from the high of the season.

Immediately east of Creek 24 are two indentations. The one visited proved to be a lagoon, its water scarcely flowing out of it into the lake. Salmon bones of the preceding season were seen on the gravel beach outside of it. The other indentation is probably of a similar nature, perhaps with an unimportant creek.

Creek 25.—August 8, 1909. Farther eastward of Creek 24 a long, shallow bight receives Creeks 25 and 26. Its western portion has shallow flats. Creek 25 has a very narrow mouth overgrown by bushes and is of the swift-current type, carrying no salmon. None was seen in the creek, either living or dead, nor any close to the mouth. Nevertheless, on the flats there were many. At the eastern end of the bight a rounded gravel point makes almost perpendicularly down into the lake. Here a large vessel could almost dock against the shore. Many salmon were schooling along this shore.

Creek 26.—August 8, 1909. No salmon were seen in this small creek. It has a little lagoon mouth a short distance east of Creek 25. Between Creeks 25 and 26 the beach is terraced with small gravel as left by the fall of the lake level. Many old salmon bones were confined mainly to the gravel, which was not continuous between the two creeks.

For some miles eastward of Creek 26 along the south shore of the lake there are no streams. At this date the fall of the lake level had exposed a border of fine gravel just above the water's edge along this region.

Somewhere between Creeks 26 and 27 there is a bay, which was entered July 28, 1908, but no creek could be found. A considerable school of red salmon in spawning color was working on a bottom of large stones and some seemed to be spawning. Red-salmon fry were seen here. Eggs were not certainly identified. For a long distance salmon were seen broaching off shore, and it seems probable there is some shore spawning here.

Creek 27.—August 8, 1908. This stream is opposite the main inlet across the lake and is an interesting example of the streams carrying few or no salmon. It has a steep grade, good bottom, strong current, and water enough to maintain a hatchery. The temperature was 42° F. There were many salmon off its mouth, but only two alive and one dead were seen in the stream. One only of the two was in spawning color. The very narrow mouth had a number of dead salmon around it. Much underbrush and deadfalls made it difficult to ascend the creek bed.

Why do the salmon refuse this stream? Many smaller ones with no better gravel beds had many spawning fish at this date and earlier. The answer may be that it is too swift and torrential for proper spawning, though salmon are able to stem its current, and its mouth, though narrow, is sufficiently accessible. One may compare certain creeks flowing into Chilkoot Lake in southeast Alaska, which appear admirable in all conditions except an abundance of quiet places but which take no salmon whatever; but compare also Creek 16, which also has a steep grade, but has many salmon. It, however, contains more resting places and quiet spawning pools. The temperature of the lake water at the surface 100 yards off-shore, beyond Creek 27, at 8 p. m., was 54°F.

Creek 28.—August 8, 1908. It is about 1 mile east of Creek 27 and of about the same size and type. Temperature at mouth 43½° F. The mouth was narrow, discharging over the beach gravel without a channel. A former channel at the mouth was nearly obliterated, and the creek made a right angle turn just before debouching. The wash of a storm, or perhaps ice, may have blocked the former mouth, which had become a seepage through gravel and larger stones. The current was swift, and the bed rose rapidly. No fish were seen in the hundred feet examined. Entrance without the channel would be difficult.

Creek 29.—August 8, 1908. Farther east of Creek 28 there is a lagoon inside the shore line. At this date after a seasonal fall of at least 40 inches it was barely above the lake level and delivering only a trickle of water. The land about was very low. It has been claimed there is a connection between Lake Aleknagik and Snake River Basin, and these conditions gave some hint of this. At this time on account of darkness no stream was identified, but the trickle of one could be heard flowing into the lagoon. However, on July 1, 1909, the place was again visited. The lagoon mouth was then 3 feet deep and three small creeks were delivering into it, while the lake level was only 6 inches below the high water for the season. It is therefore highly improbable that there is any seasonal overflow from this point to another basin. Two of the

three creeks are very small. All have brown water. Redfish fry were playing in all of them.

Creek 30.—August 9, 1909. It is of the same type and about the same size as Creek 24, running through very low land. Its estuary has low islands, gravel bars, and little sloughs. The rise of the lake would put the mouth back hundreds of yards. The creek is 40 to 50 feet wide, narrowing at the mouth. Temperature 44° F. There are many big rocks and bowlders upstream. Several hundred salmon were seen in a half-mile reach.

Creek 31.—August 9, 1908. East of Creek 30 there are no creeks for a few miles. Just before reaching the high and prominent peninsula a good-sized bight occurs, making a small peninsula on its western end. A small brown creek empties into the eastern portion of this bight, cutting a rather wide mouth through the beach gravel. Temperature at mouth 44° F. It carried many salmon for so small a stream. Many eggs and spawning fish were seen. It differs markedly in type from those carrying no salmon. It is heavily overgrown with bushes, runs through tundra-like country between mountains, and the grade rises rapidly but leaves plenty of pools and easy currents for fish. It is an excellent supplementary stream as a source of eggs.

Creek 32.—July 28, 1908. At the head of a large bay about 1 mile long behind the high peninsula. The entrance is foul with rock shoals on each side, and caution must be used in approaching. The stream is a large one, exceeded in size by not more than four or five of the lake tributaries, and drains low swampy ground with many stagnant sloughs. There is no favorable place for a dam. It very soon bifurcates, and one branch bifurcates again. It is probably made up of several or many branches. The main stream is about 20 feet wide. The ground about the mouth was at this date swampy and cut up by dry sloughs. The water was very clear and cold, with the finest kind of gravelly spawning grounds, pools, and riffles. Many highly colored redfish in spawning condition and many nests and eggs were seen. Some thousands of salmon must already have entered at this date.

Creek 33.—July 30, 1909. An insignificant stream, heavily overgrown with bushes, about a half mile east of the island at the mouth of the bay at whose head is Creek 32. There was a school of salmon and some redfish fry near the almost stagnant mouth of brown water, but there were no salmon in the few yards of the stream inspected. A few trout were seen.

Creek 34.—June 30, 1909. This important creek is about a mile west of Creek 35 and similar in size to the latter. There were some native drying racks near by. Though the stream did not appear promising at the mouth, which is less extensive than that of Creek 35 and debouches more abruptly, it contained an abundance of salmon. Besides hundreds in the mouth, 500 were tallied in less than a half mile, all in fine color and none dead. Nine days later the same reach contained not fewer than 765 living and 34 dead. Nearly all were highly colored and many making nests. This is evidently one of the best streams of the lake. The grade rises rapidly, the bed is ideal spawning ground of heavy gravel, and the water is very clear and cold. It probably does not come from a lake as does Creek 35.

A female redfish with a remarkable gill-net twine wound was seen here. The fish, which was not in full color, had an immense deep sore along the usual site of twine scars. The sore was deepest in the muscles of the back, making a gaping red wound so deeply eroded that, with the more superficial erosion extending around the belly, the two halves of the body vibrated on this wound as a hinge. The fish seemed about to break in two parts whenever it swam rapidly. It had a much fungused head and was rather feeble.

Having in mind the possibility that the salmon may acquire a terminal infection during the latter stages of life or when spent, two highly colored examples were taken from this creek and bacteriological cultures made from them. One was a dead and spent male 26 inches long, the other a dying spent female 23 inches long. Blood from the heart of each was planted in agar plates. The result was negative.

Creek 35.—July 30, 1909. In the bight south of the point which is opposite the island nearest the location of the tally rack. It is a creek of some importance, with a conspicuous estuary. The water was warmer than most of the other creeks, indicating its source in a lake that is about a half mile long and less than an hour's travel above the mouth. The grade rises rapidly, making cascades in its upper reaches. About 50 adult salmon were seen, all living. There were many fry where the stream leaves the lake, and four adults

were seen entering the latter. Algæ covered the foot of the lake and the origin of the stream. Just inside the lake, to the right, a small stream enters, coming from a spring pool 100 yards away. This cold pool contained many fry but no adults. In some seasons Creek 35 probably receives many salmon.

Creek 36.—July 27, 1909. This is a little stream 2 feet wide at its mouth emptying into the south side of the lagoon at the foot of the lake. It was not seen in 1908 and carried no salmon in 1909. It bifurcates soon and branches again, having various sources in boggy seepage in and about the sparse woods near the lagoon. It evidently does not drain any of the small lagoon-like waters lying south of the foot of the lake which were seen on July 21 from the top of the mountain near the village. One of the branches of this creek rises in an irregular seepage pool in which a number of young trout 7 or 8 inches long were seen. These were probably Dolly Vardens. A number of adults of this species were seen in the creek itself. Not a single salmon was seen in the creek, though the bottom is favorable and many pass near its mouth.

THE LARGE ESCAPEMENT OF 1908.

Certain comparable observations in 1908 and 1909 tend to throw light on the size of the escapement of 1908 as related to the preceding and succeeding years.

In 1909 the abundance of redfish fry about the shores of the lagoon and in the small shore pockets of the upper river was frequently noted and appeared to be greatly in excess of that seen in 1908. The escapement for 1907 is of course unknown, but this confirms the presumption arising on other grounds that it was a small one. In Creek 6, the whole of which was explored in both seasons, there had entered in 1908 on and before August 7 eight times as many salmon as had entered in 1909 on and before August 8. This is consonant with the records for the escapement of 1908 and 1909, which were roundly 2,600,000 and 890,000, respectively. There is thus, outside the actual figures from the tally rack, some confirmation of 1908 as a year with a very much higher escapement than that which preceded and followed it.

Unlike lakes in Alaska on which hatcheries have been established, in Lake Aleknagik the salmon do not all resort for spawning to one or two, or at most very few creeks, but spread through a wide territory represented by many creeks. Moreover, a large number of the salmon entering the lake proceed through it to the upper lakes, of which there are said to be three. What the proportion is between the numbers spawning about Lake Aleknagik and in the basins of the upper lakes is unknown but it is certain that many salmon ascend the main inlet of Aleknagik apparently bound for the upper series of lakes. There is little evidence that any great amount of spawning takes place in the inlet.

From the numbers of salmon seen in the different creeks of Aleknagik during the seasons of 1908 and 1909 up to August 9 it does not appear certain that any one creek contained enough salmon to supply a large hatchery with eggs. However, as many fish may have already passed to the upper portions of the streams, and as more were to enter before the end of the season, it is not improbable that a barricade would show from any one of several streams a quota large enough to fill a hatchery. If the supply were short, it would not be difficult to take eggs from streams at a distance from the hatchery.

Since red salmon have been successfully impounded at the Baker Lake station in Washington, the question arises whether this method can be applied to Lake Aleknagik. The temperature of the water is favorable to holding the salmon in this way. It is not likely that this method will be found expedient in this region. If gravity water supply is to be depended upon, this will control the location of the hatchery and probably place it so far up the lake that the eggs may be taken from the streams. Reports should be obtained on the condition of streams in the winter with respect to freezing and volume of flow.

KUSKOKWIM RIVER.

As conditions seemed to warrant a special investigation of the fishing and salmon-run conditions on the Kuskokwim River, Bering Sea district, Alaska, Assistant Agent L. G. Wingard was sent to the region in 1922, leaving Seattle for those waters May 30 on the steamer

Admiral Goodrich and arriving at Bethel June 13. Mr. Wingard made a careful study of conditions, his findings indicating the extent of the run of salmon and the need of conservation to prevent depletion by the influx of fishing concerns from other districts where the industry has declined. His report is as follows:

On arriving at Bethel a good, sturdy gas boat was engaged, as work in the country was to consist wholly of operations along the Kuskokwim River. The first work was the placing of markers at the mouth of the river, which is discussed in detail on page 53. Following that, all fishermen and packers on what is termed the lower river were visited and given notification of the location of the markers and the nature of the regulation governing fishing. After this the writer patrolled the river for 32 days. As every evidence during this time showed that both packers and fishermen intended in entire good faith to obey the regulation, and the run being over except for the silvers, a general trip of observation was made up the river. This trip lasted 18 days and extended as far as the Eskimo village of Tuliviksak, approximately 400 miles up the Kuskokwim River. Here high water, great quantities of drift, consisting of stumps, uprooted trees, etc., together with an unpopulated country ahead, and consequently nothing to be gained by a farther advance except the town of McGrath, which was over 100 miles farther, caused the agent to turn back to the lower river. On this trip stops were made not only at every village but at every habitation, interviewing residents, taking notes, and getting as nearly as possible all the information obtainable relative to salmon runs and fishing conditions.

As there are no canneries located on the Kuskokwim, the packing operations on the river resolve themselves into the activities of salteries and drying stations. Four salteries—Knaflich station, Jessland station, Walsh-Joaquim station, and Lundstrum-Garthy station—operated there this season. The Knaflich station, located at Apokak, 5 miles from Beacon Point, is owned and operated by Louis Knaflich and employed but three fishermen. The season's pack amounted to thirty-one 800-pound tierces of king salmon and forty-seven 200-pound barrels of red salmon. The silver pack at the time of departure was not complete. The Jessland station, located at Quigiung, 20 miles above Beacon Point, had packed 11 tierces of kings and 35 barrels of reds and had dried 3,000 chum salmon. The Walsh-Joaquim station, located 45 miles up river from Beacon Point, packed 88 tierces of kings and 24 barrels of reds and dried 5,000 chums. The Lundstrom-Garthy station, on the Kuskokwak creek, 5 miles below Beacon Point, packed 8 tierces of kings and 30 barrels of reds and dried 2,000 chums. The output of these four concerns comprises the entire commercial pack of the river that goes outside and is the total pack put up on the river by white men between Bethel and the sea. The total number of fish caught was only 35,000. In explanation of this small number it should be stated that none of the packers are large operators. Two or three natives were the most employed at any one time by them during the summer.

There are a number of small operators drying fish whose output is consumed locally or sold to persons traveling in the region. On the river above Bethel, at Steamboat Slough, Neal Corrigan dried 1,500 fish for his own dogs. Farther up the river at Ohogamute a white trader named Morgan caught 1,500 small fish and 100 kings, drying them for his own use and for barter with the natives. Five miles above Ohogamute Charley Swanson dried 1,500 small fish and 50 kings. A man named Walters, a mile below the native village of Aniak, dried 1,800 small fish and 50 kings. At Aniak a man named Johnson dried 1,650 small fish and 47 kings. At Napamute George Hoffman dried 2,000 small fish and 30 kings for his dogs and for barter. Sam Voich, 32 miles above Napamute, dried 3,500 small fish and 50 kings. At Crooked Creek a man named Dennis Perrin dried 6,000 small fish and 200 kings. At Georgetown, something like 300 miles up the Kuskokwim, George Fredericks dried 5,500 small fish and 50 kings. A short distance above Georgetown at what its known as Lousetown J. Young dried 2,500 small fish and 200 kings. Eight miles above Georgetown George Woods dried 2,200 small fish and 400 kings. Thirteen miles below Sleitmute, a native village 350 miles from the sea, two partners, Nick Millet and J. Johnson, dried 3,000 small fish and 150 kings. At Sleitmute a white trader, George Bishop, employed a native fisherman, and after drying 250 small fish, desisted on account of high water. Fifty miles above Sleitmute, at the native village Tuliviksak, a trader, Ora Barnhardt, also had a native fishing

for him but was in turn discouraged by the high water after he had dried more than 100 small fish.

The term "small fish" is used on the Kuskokwim to indicate red salmon and chum salmon, no distinction being made between these two varieties by driers. At the salteries, however, they split the reds for salting and dry the chums for winter use locally.

From observations and from reports of the white traders and trappers it seems that the natives of the Kuskokwim do not depend upon dried salmon for their winter food supply in by any means as large a ratio as do the natives of the Copper River region, or of the Kvichak district, one reason being that about only one-half of the native families have dog teams, and those consist of but two to five dogs.

On the lower river—that is to say, between Bethel and the sea—the native makes his living by trapping and fishing, deriving the larger part of his livelihood by shooting muskrats and trapping foxes. The natives are seminomadic, each family apparently having three or four homes. One of these is a summer salmon camp, where a tent is pitched or where there is an old barabara built in previous years. There the family lives through the fishing season on salmon and dries a few for winter use. After the salmon run the family will move to some permanent camping grounds, usually a village, which is its winter headquarters. There the native trades, bartering a portion of his dried fish for food or other articles he needs, and fishes for the ever abundant whitefish and smelt in the sloughs and for blackfish, called by the natives Chinagik, in the lakes. All of these fish are easily taken and furnish a constant source of fresh food supply during the winter in noteworthy contrast with the very large amount of dried fish eaten by natives farther south in the Bering Sea region. For these reasons and the further fact that he is an active hair-seal hunter in the early spring, the Kuskokwim native is not dependent upon dried salmon to the extent that natives in other sections are.

There were roughly 150,000 small fish dried in the 15 native villages between Bethel and the sea. This allowed 1,000 fish for each family, which is the number the consensus of opinion on the river credited the average native family with putting up and the average of the agent's counts tallied with this number. One-half of these and sometimes more are sold or bartered, leaving the rest for home consumption.

In 50 native villages and camps above Bethel 150 families were found, each one of which averaged the usual 1,000 dried fish, or 150,000 in all. These upriver natives impressed one as being more energetic and thrifty than the lower Kuskokwim or tundra natives. With the conditions for fishing not as good as on the lower river, they nevertheless made fair catches under adverse circumstances. Driftwood, consisting of huge logs and roots of trees, together with swift and high water throughout the entire fishing season, resulted in the ruin of nearly all their fish wheels.

As one of the matters to be investigated was the amount of salmon available for the use of the natives, it can be reported, after traveling 300 miles upstream from Bethel and visiting more than 50 villages, that the natives have sufficient dried salmon for both themselves and their dog teams.

Whitefish, before referred to, are caught throughout the winter by natives, giving them fresh fish, which are relished more than dried fish. The natives also subsist largely on game in the winter, such as ptarmigan, Arctic hares, and snowshoe rabbits. These, with an occasional moose and caribou, together with smelt taken during the run of this small fish in the winter, and with provisions secured from the white traders, such as flour, rice, tea, and sugar, make ample provision for these people. Berries are an important article of diet among families with a semblance of thrift.

The Kuskokwim native is quiet and peaceable, possibly a little less advanced in civilization than are the natives of the Kvichak River region. In all about 65 villages and camps were visited, and some of these contained as many as 30 families.

There are tabulated below a few of the villages visited, with the number of families in each and the amount of fish dried. The number of fish in the shed were determined by entering the smokehouse or drying rack where the fish were curing. Because the natives were late in beginning fishing, as mentioned before, they caught very few king salmon, many of the families drying none at all. Many camps that had no name were visited. These have been designated as camps and placed in the order in which they came, traveling from Bethel up river.

Native villages on the Kuskokwim River and approximate number of salmon dried in each.

BELOW BETHEL.

Name of village.	Number of families.	Number of fish.	Name of village.	Number of families	Number of fish.
Apokak	17	8,700	Napagahogamute	14	15,000
Davis Pt	3	1,500	Napaiskak	9	5,500
Quickchogamute	12	7,500	Kalagamute (Lower)	7	7,500
Kiktok	5	2,200	Kalagamute (Upper)	5	5,500
Quigiung	2	1,750	Kokokamute	22	20,000
Quigiugh	7	7,000	Popokamute	31	30,000
Ichikshkomute	19	20,000	Four camps	11	12,000
Lomavik	11	9,000			
Moravian Mission	1	2,200	Total	176	155,350

BETHEL AND ABOVE.

Name of village.	Number of families.	Number of fish.	Apparatus.		Name of village.	Number of families.	Number of fish.	Apparatus.	
			Set nets.	Fish wheels.				Set nets.	Fish wheels.
Bethel	7	5,500	1	.....	Napamute	1	400	.....	1
Five camps	14	15,000	1	.....	Martin Village	6	7,000	1	3
Akiachuk	23	18,000	1	.....	Three camps	3	3,500	.....	3
One camp	3	3,200	1	.....	Canoe Village	3	10,000	.....	2
Tulaksak (Main)	6	4,500	1	.....	Two camps	3	4,100	.....	3
Tulaksak (Lower)	2	1,500	1	.....	Georgetown	1	700	.....	1
Tulaksak (Upper)	3	2,000	1	.....	Lousetown	1	1,200	.....	1
Koskogamute	14	16,000	.....	1	Two camps	4	3,300	.....	4
Ohogamute	7	9,000	1	3	Sleitmute	5	1,200	.....	5
Two camps	5	11,000	1	4	Tuliksak	2	400	.....	2
Crow Village	2	5,500	.....	2					
Aniak	1	1,100	.....	1	Total	117	125,800	10	37
Russian Mission	1	1,700	.....	1					

MARKERS.

The location of the markers at the mouth of the Kuskokwim River did not prove satisfactory to the fishermen and packers on the lower river, as markers had never before been placed on the Kuskokwim, the regulations being promulgated only at the close of last season.

Upon arriving on the Kuskokwim the markers were placed immediately at points directed by the bureau, the one at Popokamute Point being fixed June 15 and the one at Beacon Point June 16. Following this all the operators were visited and informed of the ruling of the bureau and also of the further fact that the markers were already in position. In conversation with them it became apparent that they all were of the opinion that the markers were too far down the river. They felt it was imposing a needless hardship upon fishermen to ask them to go outside the line drawn across the river by the markers, it being practically a big bay, wide open to the sea, with rough weather nearly all the time and generally a sea running. The present fishing operations, they felt, were of such small volume, and the methods and gear employed in the catch would be considered so ineffective where large operations are under way in other portions of Alaska that it was needless to go so far down the stream.

The writer agreed with them in the matter of the small demand made upon the river at this stage of the fishing and packing operations, but informed them at the same time that the prohibitive locations were made as a matter of stream protection in case other and larger operators came in; that the bureau had in view such efficient protection of the Kuskokwim as would keep the river runs of salmon up to their present level throughout perpetuity. The conversations ended by all admitting that as the regulation was made and in force they would have to abide by it for the present, but nearly all of them expressed the hope that the matter would be reconsidered and the markers placed farther upstream so that they would have at least some sheltered water to fish in.

Going farther into the discussion of the locations of these markers, which may in the wisdom of the bureau require further consideration, it may be said that the Kuskokwim is about 14 miles wide at the point where the prohibitive line from marker to marker crosses the river. The river at this point is rapidly widening into the ocean, and as the stream opens to the south, from which prevailing storms blow, it reduces the matter of fishing to open-sea operations, with a high sea, due to storms, generally running. The Kuskokwim fishermen and operators nearly all asked that fishing should be permitted upriver as far as Helmick Point, which is 8 miles above the upper end of Eek Island. At the very least they requested that the markers be placed not higher than Quigiung and West Point, which would bring the prohibitive line across the river just at the upper end or head of Eek Island. Notwithstanding the discussions that arose over the locations and the objections to the sites of the markers, as far as observed or ascertained, there was no infraction of the regulations.

RUNS OF SALMON.

Four salmon runs seasonally enter the Kuskokwim River, consisting of the king, red, silver, and chum salmon runs. There is no humpback-salmon run. It is commonly reported that the run of silvers is the largest and the chum salmon next, with the red salmon a close third. The run of kings is the smallest in point of numbers, yet, owing to the size of the fish this run, weight for weight, will likely equal the red-salmon run.

The first run of the season is that of the kings, which commences about June 10 and lasts hardly a month. While the kings are still in the river, along about June 25, red salmon are found in scattering numbers and by July 1 the run is good. Two or three days after the first red salmon appear in the river chum salmon commence showing up, these two species running almost simultaneously. Both runs last about three weeks, with the peaks of the runs passing between July 1 and 10, storms out on the ocean often either retarding or accelerating the action of the runs. By the 1st of August silvers are running and continue almost until the time of the freeze-up.

Owing to the severe storms this season all the salmon runs were about 10 days ahead of time. This advance in time was not known along the river, and by catching the fishermen unawares a third of the run got up river before gear was in the water. The natives were particularly tardy in opening fishing. It was the first open season on beaver and marten trapping in several years, and they were still occupied with dressing and bartering their furs.

By comparing and sifting information obtained from interviews with hundreds of native fishermen and with every one of the white fishermen and checking them with the writer's own observations a fair estimate of the volume of the different salmon runs in the Kuskokwim River was arrived at. The red-salmon run is about one-half of the red-salmon run in the Egegik River. The run of chums is fully as large as the run of chums in the Egegik. As for the silver run it is doubtless as large as the run of silvers in any of the other rivers flowing into Bering Sea. The general comment everywhere along the Kuskokwim was that the silver run was always heavy, and many stories and statements were constantly forthcoming as to the strength of the run of this fish. The king salmon run also would stand on about the same level as the run of kings in the Egegik.

As for good and poor years, considered from the standpoint of the salmon run, not a great deal of information could be obtained. The general opinion among the fishermen, both white and native, seemed to be that there were two good years with large runs and two poor years with lean runs.

Fishing on the Kuskokwim is carried on by fish wheels and set nets. The fish wheel is not used at all on either the Nushagak or the Kvichak, which are sister rivers in the Bering Sea country. Set-net operators, taking advantage of the tides, can utilize nets of from 25 to 30 fathoms in length on all the lower river where the tidal ebb and flow offers the advantage of rising and falling waters. Above the tides eddies in the stream are utilized and fair fishing locations found. Wheels are placed on exposed points where the salmon crowd the meandering line of the stream in rounding the curve.

NATURAL ENEMIES.

As for natural enemies there are not as many gulls and terns in Kuskokwim waters as on other salmon streams of Alaska. There are more seals and belugas there ordinarily, if reports given by many different fishermen are cor-

rect, but as yet this season both of these pests were very scarce on the river. In this connection Al Walsh, of the Walsh-Joaquim saltery, has for several years been keeping a systematic tab on the salmon taken that have seal marks on them. Last season he found that "seal marked" king salmon averaged 1 in every 30 fish taken. This season there was but 1 so marked in every 72 caught. Natives also caught very few seals the past spring. In consequence of this there will be a shortage the coming winter of the seal muckluck which is so dear to the comfort of the average native.

GENERAL DESCRIPTION OF THE KUSKOKWIM.

In topography and physical conditions the Kuskokwim district is very similar to the Kvichak River. The volume of water flowing out of the river is much larger, however. In addition to being one of the largest rivers of Alaska, the Kuskokwim is also distinguished by the fact that it is the only Alaskan stream of any consequence that has not had salmon canneries operating upon it. Flowing out of the mountains of the interior the upper river is a swiftly running stream with many large tributaries feeding it. One hundred and twenty-five miles from its mouth the river leaves a rolling country covered with clumps of spruce, willow, and birch, and from that point onward traverses a tundra plain to the sea. Shallow waters, bars, sloughs, and a tendency of the stream to shift channels are the features of this portion of the river. The freeze-up in the fall and the break-up in the spring occur at approximately the same time as in the Naknek and the Kvichak Rivers in Bristol Bay. When the spring break-up takes place the river rises with the melting snow and ice, then as the season advances gradually falls, and by midsummer is very low. This season the water was from 5 to 7 feet above the normal summer level and higher than the average rise during break-up. The river, as is usual with tundra streams, has a wide bed and plenty of room for surplus water, but, owing to continued rains in July, the water, which had started to fall, suddenly commenced rising again. The old timers said over and over that it had been many and many a year since there was such high water during the summer as during this second rise.

The damage done was large, considering the small number of people living in the immediate valley of the stream. On the trip up the river at least four out of every five fish wheels encountered were damaged in varying extent, only those on sheltered sloughs escaping damage. Some of them were entirely swept away, others being jammed, splintered, and portions of them carried downstream. The greatest loss was caused by logs and stumps drifting against the wheels.

The Kuskokwim River country naturally divides itself into upper and lower river regions. The line of division crosses the valley of the river at Bethel, where, as stated, the country breaks from a region of rolling landscape into a low-lying tundra country, which reaches away to Bering Sea. Much of this lower river country has water upon it when there are extreme high tides and storms driving inland. Small lakes everywhere dot these thousands of square miles of monotonous tundra, which is treeless. Just above Bethel scattering, stunted spruce, birch, and willow begin showing, and about 30 or 40 miles farther up the river timber is scattered profusely over a rolling country.

The tidal flow on the Kuskokwim is noticeable 75 miles from the mouth, but the current of the river shows the retarding effects of the tide as far up as Akiak, over 100 miles from the sea. The height of the tides is not so great on the Kuskokwim as on the Kvichak and the Nushagak.

In an endeavor to give the bureau an accurate "close-up" of the general conditions of life in the Kuskokwim district it may be stated that in the whole district, from the Tuliviksak tributary to the sea, approximately 400 miles, there are 300 native families and about 75 white people. They all live along the river, either on the banks of the river proper or on sloughs paralleling the river and forming part of it. The natives of the lower river live in an igloo form of structure, as do many of the natives in the Kvichak region, more energetic families sometimes having log cabins. The home life, as is usual in the isolation of the Northland, is somewhat barren. Hunting, fishing, trapping, prospecting, and trading form the occupations of the whites. The natives live by trapping, fishing, and hunting. Although the region is sparsely settled, yet mile for mile there are more families on its banks than on the Kvichak River.

Communication is carried on up and down the river by three small river steamers, which operate from Bethel. These steamers are the *Tana*, owned and operated by Captain Langley; the *Quickstep*, operated by Captain Green; and the *Tacotna*, operated by Captain Buggy. They carry freight, mail, and passengers and serve the little trading posts and native villages, and through their offices the necessities, many of the comforts, and a few of the luxuries of life reach the modest huts of the natives and whites scattered up and down the river.

The trading center of the Kuskokwim region is the little town of Bethel. It is situated on the northwest bank of the river, 80 miles from its mouth, at the head of sea navigation. It is also the judicial center of the region, United States Marshal J. L. Heron and also United States Commissioner Bohnam being located there, and has the Government school for the natives. The Moravian Mission has a church, sawmill, and large launch there and makes Bethel the general headquarters for their mission operations in the Kuskokwim region. There are two stores and several independent traders. A native village of 15 or 20 families forms part of the community. There are several white families and five or six white men with native wives.

Situated 40 miles upriver from Bethel is Akiak, a native village, where a hospital, school, and the office of the superintendent of schools are located. Going on up the river white men are found about every 50 miles operating trading posts or roadhouses. Most of them have native wives.

On the lower river—that is, below Bethel—there are a few scattering whites, who trade with the natives, bartering provisions and various articles for fur. In the summer they fish; in the winter they do a little trapping. Their life is an easy, indolent, and, it might be said, shiftless existence. Of course, there is thrift showing here and there.

The spirit with which the people along the river accepted the entrance of the bureau into the fishing operations of the district was gratifying. Both fishermen and packers seemed much pleased to have their corner of the world officially recognized by a department of the Government, and during the writer's entire stay he was cordially received and on no occasion was aware of any resentment because of the efforts of the bureau to regulate fishing. While some were visibly disappointed, as noted elsewhere in this report, with the point of location of the prohibitive markers, the spirit seemed to be to accept the regulation and abide by it. The inference given everywhere in conversations with these men was that they were interested in the conservation of the fish runs and stood ready to cooperate, a feeling very different from the attitude taken elsewhere on occasions by many fishermen and even packers. The impression given on the writer's departure was that the entire fishing interests of the Kuskokwim would welcome a return of bureau representatives year by year. In the case of the Walsh-Joaquim and Jessland stations fishing was begun before the writer's arrival and consequently before any markers were set, so that they had been fishing above the limits as prescribed by the bureau. After placing the markers and giving notice of the same to the operators concerned, there was no evidence of any attempt to evade the law.

If the salmon runs of the Kuskokwim are carefully conserved, the time may come when, due to depletion of runs in other streams of Alaska, the modest-sized runs of this river will measure up to the size of the receding runs of other salmon rivers of Alaska, and the Kuskokwim will then take an important place in the fisheries of the North. Certainly the runs should be carefully protected to start with.

CHIGNIK SALMON COUNTS.

Arrangements were made in the spring of 1922 for the counting of salmon ascending Chignik River to spawn, and a crew consisting of John W. Gardner, Charles Petry, warden, and three others left Seattle April 5 to install a rack through which the fish should pass to enable counting. All necessary supplies and the small patrol boat *Merganser* were transported on the *St. Paul*, of the Northwestern Fisheries Co., from Seattle to Chignik, reaching there on April 25.

Construction of the rack was begun at once at a point several miles up the Chignik River, where it is 464 feet wide and from 2 to

FIG. 7.—Salmon counting rack in Chignik River.

FIG. 8.—Upstream side of rack in Chignik River.

4 feet deep. The rack was of tripod and picket construction, standing 4 feet above low water, but because of high tides it was found necessary to raise its height 5 feet by means of wire netting. A plank walk extended along the top of the pickets, and four openings were built in the rack for passage of fish, the counter to stand directly over an opening. A gate 6 feet wide was constructed for the passage of small boats.

The rack was practically completed by June 2, and on June 9 the first salmon was seen below it. Counting was continued until fish ceased running October 20. A total of 428,976 red, 58,300 coho, and 241 king salmon were counted during this period. Humpback and chum salmon were not counted, but it was estimated that probably 15,000 humpback and 1,200 chum salmon ascended the river. These two species spawn chiefly in the creeks that empty into Chignik Bay and Lagoon. Reports of the three companies operating at Chignik show a catch of 1,403,701 red salmon, indicating that the escapement in the season of 1922 was only 23.4 per cent, or less than one-fourth of the total run. The counting experiment will be continued over a series of years with a view to determining a basis for commercial operations in this district.

KARLUK SALMON COUNTS.

Red salmon ascending the Karluk River for spawning purposes were counted in 1922 as they passed through a rack 360 feet long placed across the river about half a mile above the lagoon. Everything was in readiness at the rack by May 12, and the first salmon were counted on May 20. Considerable numbers of Dolly Varden trout were captured by means of trap and seine, and large numbers also were destroyed by dynamite before the appearance of salmon necessitated stopping its use. Counting was in charge of Fred R. Lucas, who was detailed from the bureau's hatchery at Afognak. It was reported that considerable difficulty was experienced with humpback salmon, which spawned in large numbers above and below the rack and in some instances undermined sections of it. Thousands of the dead fish were carried down in a slight rise of water, and it was necessary to open a section of the rack to let them pass through in order to prevent the water damming up and carrying out the rack.

The ascent of salmon continued until October 22, a total of 384,683 reds and 9,752 kings passing through the rack during the season. No count of other species was made. Upon the basis of reports of the various companies securing salmon from Karluk it is computed that approximately 700,000 red salmon were captured. The escapement for spawning purposes was thus slightly over 35 per cent of the total run.

YUKON RIVER FISHERY.

The general prohibition on commercial fishing for salmon on the Yukon River for export from Alaska was in force in the season of 1922. The floating cannery of the Carlisle Packing Co., which was operated at Kwiguk Slough in 1921, was towed out at the end of that season and found a new location on Bristol Bay, where it was operated in 1922.

The mild-curing plant of Waechter Bros., which was located on Leslies Island, outside of the protected zone, continued operations in

1922, all of its fishing being carried on in the shallow waters of Bering Sea, extending several miles off the delta. The season was successful, fishing operations beginning June 10 and ending July 11, when it was necessary to close the plant in order to make connections at St. Michaels with the steamship *Victoria*, which took the pack to Seattle. The total catch was 16,825 kings, from which 277 tierces were mild cured and 26 tons frozen. The 2,787 chum salmon taken were turned over to the natives camped around the saltery. Rates paid for king salmon ranged from 25 to 35 cents each to fishermen who were furnished gear by the company, and 40 to 60 cents to independent fishermen. Chum salmon were not purchased by the company.

The bureau's representative reported that the catch by natives along the river was probably the smallest in its history, which was probably due to the extreme high water, the river being bank full all summer, the longest stage of high water ever known. At a number of places good catches were made, which indicated that there was a normal run. It was reported also that the natives fished less diligently than usual, as in many places they were still supplied with money from the sale of their large catch of furs the previous winter. All occupied camps from the delta to Rampart Rapids were visited, the catch being estimated at approximately 15,000 kings and 215 tons of dried dog salmon. In addition, W. F. O'Connor, at Andreafsky, and Charles Homeier, at Mountain Village, put up small packs of canned salmon, 448 cases and 43 cases, respectively, for local use.

HATCHERIES.

EXTENT OF OPERATIONS.

Four hatcheries, exclusive of Territorial plants, were again operated in Alaska in 1922. Two belong to the United States and are located at Afognak Lake on Afognak Island and at McDonald Lake near Yes Bay in southeast Alaska. A third is maintained by the Alaska Packers Association at Loring, and the fourth by the Northwestern Fisheries Co. at Quadra. The total number of red-salmon eggs collected at these four hatcheries in 1922 was 110,745,000, which is a decrease of 17,455,000 from the collections of 1921. The largest decrease occurred at McDonald Lake, where the take of eggs in 1922 was 26,000,000 less than in 1921.

Operations of Federal and private hatcheries in Alaska in 1922.

Location of hatchery	Red or sockeye salmon.		
	Eggs taken in 1921.	Salmon liberated in 1921–22.	Eggs taken in 1922.
McDonald Lake	[1] 51,000,000	47,640,000	25,000,000
Afognak Lake	[2] 33,835,000	32,580,000	[3] 61,790,000
Fortmann	13,380,000	12,885,000	17,760,000
Quadra	9,985,000	9,647,000	6,195,000
Total	128,200,000	102,752,000	110,745,000

[1] 150,000 eyed eggs planted in two lakes adjacent to the hatchery.
[2] Shipped 5,200,000 red salmon eggs to State hatchery at Bonneville, Oreg.
[3] Shipped to Territorial Fish Commission 5,098,936 red-salmon eggs; to State hatchery at Bonneville, Oreg., 5,045,000 red-salmon eggs; to the Washington State Fish Commission 534,464 red-salmon eggs.

HATCHERY REBATES.

The Federal fishery law of Alaska, approved June 26, 1906, provides that the owners of privately operated hatcheries shall be exempt from the payment of all taxes and license fees on their catch and pack of salmon at the rate of 40 cents per 1,000 red or king-salmon fry liberated.

Rebates credited to private salmon hatcheries, fiscal year ended June 30, 1922.

Owner.	Location.	Red-salmon fry liberated.	Rebate due.
Alaska Packers Association	Naha Stream	12,885,000	$5,154.00
Northwestern Fisheries Co.	Hugh Smith Lake	9,647,000	3,858.80
Total		22,532,000	9,012.80

HATCHERY OPERATIONS.

M'DONALD LAKE.

In 1921 the collection of red-salmon eggs aggregated 51,000,000, from which 47,640,000 fry and fingerlings were liberated. In addition 150,000 eyed eggs were planted in two lakes adjacent to the hatchery. The loss of eggs and fry together was 6.6 per cent. In 1922, 210,000 humpback-salmon fingerlings were liberated. In the season of 1922 egg taking began on September 7 and was completed on September 22, between which dates 25,000,000 red-salmon eggs and 499,200 humpback-salmon eggs were taken.

AFOGNAK.

From the collection of 53,835,000 red-salmon eggs taken at Afognak in 1921 there were shipped to the State hatchery at Bonneville, Oreg., 5,200,000 eggs. Out of the remaining 48,635,000 there were lost 2,614,000 eggs, and 46,021,000 fry were hatched. The loss of fry aggregated 13,441,000, the plantings of red-salmon fry being 32,580,000. An epidemic in May and June, 1921, occasioned a very heavy loss of fry. Its cause is thought to have been due in part at least to low vitality of the parent fish occasioned by exceedingly low water that occurred the latter part of the previous August and early September when the take of eggs was heavy. No doubt such reduced vitality might have been transmitted from the parent fish to the eggs and fry.

In the season of 1922, in the period from August 1 to September 14, the take of red-salmon eggs was 61,790,000. Of these 10,678,400 were shipped in September, 5,098,936 going to the Alaska Territorial Fish Commission at Juneau, 5,045,000 to the Oregon Fish Commission at Bonneville, and 534,464 to the State Fish Commission at Seattle, Wash. In addition, 600,000 humpback-salmon eggs were taken, of which 278,616 were shipped to the bureau's hatchery at Birdsview, Wash.

FORTMANN.

The Fortmann hatchery of the Alaska Packers Association on Heckman Lake, Revillagigedo Island, liberated 12,885,000 young red

salmon in Naha stream and lakes out of 13,380,000 eggs collected in 1921. The loss of eggs was 3.7 per cent. In addition 830,000 humpback-salmon fry were hatched from 900,000 eggs collected in 1921 and liberated in the same water system. Egg taking in 1922 began August 28 and ended November 4 after 17,760,000 red and 240,000 humpback-salmon eggs were collected.

QUADRA.

The hatchery of the Northwestern Fisheries Co. on Hugh Smith Lake produced and released 9,647,000 red-salmon fry out of a total collection of 9,985,000 eggs in 1921. The loss was 3.4 per cent. Spawn taking began in 1922 on August 11 and ended November 21, after 6,195,000 red-salmon eggs had been taken.

TERRITORIAL HATCHERIES.

The Alaska Territorial Fish Commission carried on salmon culture at Eyak Lake near Cordova and at Auk Lake and Anan Creek in southeast Alaska. At Eyak Lake 3,134,000 red-salmon eggs were taken, from which 3,078,000 were eyed and planted in the gravel of streams tributary to that lake, there being a loss of 56,000 eggs during the period of incubation. Spawn taking began in this field on July 6 and was discontinued August 1. At Auk Lake 945,000 red-salmon eggs were collected and transferred to the hatchery at Juneau, from which 779,000 fry were produced and distributed in streams of the Juneau district. In addition a shipment of 5,098,936 red-salmon eggs was received from the Federal Bureau of Fisheries station at Afognak, from which 4,933,000 fry were hatched. Of this number 2,600,000 were planted in Auk Lake and 400,000 on Mendenhall Bar.

The commission operated a humpback-salmon collecting station on Anan Creek during July and August and secured a total of 250,000 eggs. These were transferred to Juneau in a green state with a loss of approximately 50 per cent. The 121,000 fry that resulted were distributed in the Juneau district.

At the beginning of the year 100,000 coho fingerlings were being held in the Juneau hatchery. These were planted during the summer in streams and lakes tributary to Gastineau Channel and Lynn Canal.

In addition to its fish-cultural operations the commission continued the work of removing obstructions from salmon streams, thus opening larger areas to the spawning fish. Several streams in the Seward and Ketchikan districts were cleared during the year, $3,659.04 being expended in this work.

EGG COLLECTIONS BY WASHINGTON STATE FISHERY AUTHORITIES.

Early in the season the Washington State Fish Commission applied for permission to make collections of humpback-salmon eggs in southeast and central Alaska, stating that approximately half of them would be planted in the waters of the State of Washington and the remainder returned to the streams from which they were secured. The bureau took the position that it could not recommend the granting of the desired permission even could it be lawfully

done, for the reason that the fisheries of the Territory were in a precarious state and the export of eggs would add to the already existing danger of serious depletion of the streams.

The bureau's representative in charge of the southeast district reported by telegraph August 14 that a barricade had been placed in Anan Creek that was causing the death of thousands of salmon and also that preparations were being made to collect 20,000,000 humpback-salmon eggs for shipment to Puget Sound, with apparently no preparation to stock Alaskan streams with salmon equaling the number of eyed eggs to be exported. Instructions were at once issued to remove the barricade in Anan Creek, which was accordingly done on August 25 without any eggs having been taken.

On August 15 the bureau's agent at Cordova reported that over 10,000,000 humpback-salmon eggs had been collected by representatives of the Washington State Fish Commission at Irish Cove, on Fidalgo Bay, Prince William Sound, which probably would be a total loss. This was due to the use of water from the vicinity of an abandoned copper mine. Instructions were at once issued that the eggs on hand be planted and all operations cease. In the meantime the operations of the commission had been moved to the head of Whalen Bay, where the water proved to be more suitable for development of the eggs and further large collections had been made.

An agreement was reached with the Washington State Fish Commission on August 24 (1) that the operations at Anan Creek should cease entirely, (2) that the healthy eggs already secured on Prince William Sound should be eyed for shipment but no further collections made, and (3) that the expedition would withdraw entirely from Alaska. Final reports from the bureau's representative at Cordova, who inspected the shipments, indicated that the total sent out in October was 14,571,708 eyed humpback-salmon eggs.

GENERAL STATISTICS OF THE FISHERIES.

In 1922 the total investment in the fisheries of Alaska was $54,590,302, or $15,589,206 more than in 1921. The investment in the herring industry more than doubled that of 1921, and the salmon industry investment increased more than 25 per cent. Of the total investment, $47,509,138, or approximately 87 per cent, was in the salmon industry alone. Employment was given to 21,974 persons, or 6,904 more than in 1921. The total value of the products in 1922 was $36,170,948, or $12,084,081 more than in 1921.

Summary of investments in the Alaska fisheries in 1922.

Industries.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Salmon canning	$17,032,035	$10,373,814	$17,801,708	$45,207,557
Salmon mild curing	1,572,025			1,572,025
Salmon pickling		123,779	387,219	510,998
Salmon, fresh	35,541			35,541
Salmon by-products	183,017			183,017
Halibut fishery	1,839,910			1,839,910
Herring fishery	872,550	2,471,088	24,203	3,367,841
Cod fishery		778,376		778,376
Shrimp fishery	163,111			163,111
Crab fishery	129,976			129,976
Whale fishery		374,057	427,893	801,950
Total	21,828,165	14,121,114	18,641,023	54,590,302

Summary of persons engaged in the Alaska fisheries in 1922.

Races.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Whites	4,620	3,423	4,386	12,429
Natives	2,675	1,147	370	4,192
Chinese	383	313	526	1,222
Japanese	482	346	96	924
Filipinos	649	300	575	1,524
Mexicans	70	92	1,216	1,378
Negroes	6	20	126	152
Miscellaneous	48	28	77	153
Total	8,933	5,669	7,372	21,974

Summary of products of the Alaska fisheries in 1922.

Products.		Quantity.	Value.
Salmon:			
Canned	cases	4,501,652	$29,787,193
Mild cured	pounds	4,266,050	821,169
Pickled	do	3,585,100	248,015
Frozen	do	3,849,153	261,094
Fresh	do	3,802,729	271,869
Dried and smoked	do	906,550	148,464
Fertilizer	do	774,000	23,438
Oil	gallons	12,989	5,015
Herring:			
Fresh for bait	pounds	824,600	8,246
Frozen for bait	do	2,664,015	23,340
Pickled, Scotch cure	do	35,995,450	2,030,975
Pickled, Norwegian cure	do	237,850	14,009
Dry salted for food	do	240,000	9,600
Fertilizer	do	3,292,000	98,528
Oil	gallons	425,241	144,418
Halibut:			
Fresh	pounds	7,886,764	772,610
Frozen	do	3,188,473	262,357
Cod:			
Dry salted	do	6,085,989	458,958
Pickled	do	16,800	925
Stockfish	do	20,000	3,000
Tongues	do	11,860	1,186
Oil	gallons	100	100
Whale:			
Oil	do	904,359	328,944
Fertilizer	pounds	3,092,480	78,974
Whalebone	do	14,000	1,400
Ivory (teeth)	do	500	200
Clams	do	32,290	185,007
Shrimps	do	336,380	126,690
Crabs:			
Canned	cases	4,619	46,231
Fresh meat	pounds	120	48
Whole in shell	dozen	383	1,100
Trout:			
Fresh	pounds	64,727	5,266
Canned	cases	134	648
Sablefish	pounds	49,167	1,538
Flatfish	do	12,255	367
Ling cod	do	1,327	26
Total			[1] 36,170,948

[1] These figures represent the value of the manufactured product. It is estimated that the value of the catch to the fishermen was approximately $10,000,000.

SALMON INDUSTRY.

Among the notable developments of the salmon industry in 1922 may be mentioned the increased production of canned salmon in western Alaska and the surprisingly large run of humpback salmon in the Ketchikan district of southeast Alaska. The pack in

both of these districts again reached normal proportions, and that in central Alaska was not far below the average for several years.

The condition of the salmon fisheries in the northern section of southeast Alaska was unsatisfactory, and concern is felt over the very evident decline of the salmon runs in that region. Several canneries in the affected district were idle during the year, and at most of those that did operate much smaller packs were made, showing unmistakably that the supply of salmon is depleted.

SALMON CATCH AND APPARATUS.

In 1922 there were used in the salmon fisheries of Alaska 160 beach seines, aggregating 21,905 fathoms, and 289 purse seines, aggregating 48,600 fathoms, a total of 449 seines or 70,505 fathoms, an increase over 1921 of 236 seines or 35,442 fathoms. Southeast Alaska is credited with 308 seines, having a total length of 48,380 fathoms; central Alaska, with 119 seines, having a total length of 17,525 fathoms; and western Alaska, with 22 seines, having a total length of 4,600 fathoms.

The gill nets operated in the salmon industry in 1922 total 3,335, aggregating 378,440 fathoms of webbing, an increase over 1921 of 100 nets and 3,120 fathoms. Operators in southeast Alaska used 270 gill nets, with 28,775 fathoms of webbing; in central Alaska, 1,010 gill nets, with 71,930 fathoms; and in western Alaska 2,055 gill nets, with 277,735 fathoms.

The total number of traps used in the salmon industry in 1922 was 111 floating and 265 driven, a total of 376, an increase of 196 traps over the number in 1921. Southeast Alaska is credited with 138 driven and 109 floating traps; central Alaska with 118 driven and 2 floating; and western Alaska with 9 driven. Southeast Alaska is credited with 5,790 lines used in taking salmon and western Alaska with 7 salmon wheels. Of the total catch of salmon approximately 23 per cent were taken in seines, 35 per cent in gill nets, and 41 per cent in traps. Less than 1 per cent was taken by all other methods combined.

Percentage of salmon caught in each Alaska district, by principal forms of apparatus.

Apparatus.	Southeast Alaska.		Central Alaska.		Western Alaska.	
	1921	1922	1921	1922	1921	1922
Seines	32	36	25	28	6	4
Gill nets	5	2	10	7	90	93
Traps	56	60	63	65	3	2

In 1922 the total take of salmon was 72,370,400, as compared with 37,905,591 in 1921, an increase of 34,464,809, or approximately 91 per cent. The increase occurred in all three districts of Alaska, that of southeast Alaska being 19,202,791, central Alaska 7,683,497, and western Alaska 7,578,521. As compared with 1921 the catch in Alaska shows that cohos increased 655,889, chums 2,636,982, hump-

backs 23,432,524, and reds 7,795,481. Kings decreased 56,067. The number of humpbacks taken in 1922 was an increase of approximately 327 per cent over the take of 1921.

Salmon taken in 1922, by apparatus and species, for each geographic section of Alaska.

Apparatus and species.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Seines:				
Coho, or silver	336,201	91,348	----------	427,549
Chum, or keta	2,278,660	164,831	5,166	2,448,657
Humpback, or pink	7,835,208	2,880,490	----------	10,715,698
King, or spring	2,705	2,963	2,386	8,054
Red, or sockeye	614,478	1,286,944	1,029,674	2,931,096
Total	11,067,252	4,426,576	1,037,226	16,531,054
Gill nets:				
Coho, or silver	122,870	6,303	163,131	292,304
Chum, or keta	49,169	3,357	614,882	667,408
Humpback, or pink	38,972	148,250	220,288	407,510
King, or spring	73,884	23,151	89,863	186,898
Red, or sockeye	316,109	826,198	22,918,065	24,060,372
Total	601,004	1,007,259	24,006,229	25,614,492
Traps:				
Coho, or silver	679,586	269,075	----------	948,661
Chum, or keta	1,398,044	700,641	39,040	2,137,725
Humpback, or pink	15,649,373	3,747,254	69,507	19,466,134
King, or spring	32,223	26,522	9,160	67,905
Red, or sockeye	952,295	5,435,516	519,493	6,907,304
Total	18,711,521	10,179,008	637,200	29,527,729
Lines:				
Coho, or silver	168,580	----------	----------	168,580
Chum, or keta	93	----------	----------	93
King, or spring	506,852	----------	----------	506,852
Total	675,525	----------	----------	675,525
Wheels:				
Coho, or silver	----------	----------	1,000	1,000
Chum, or keta	----------	----------	20,000	20,000
King, or spring	----------	----------	600	600
Total	----------	----------	21,600	21,600
Total:				
Coho, or silver	1,307,237	366,726	164,131	1,838,094
Chum, or keta	3,725,966	868,829	679,088	5,273,883
Humpback, or pink	23,523,553	6,775,994	289,795	30,589,342
King, or spring	615,664	52,636	102,009	770,309
Red, or sockeye	1,882,882	7,548,658	24,467,232	33,898,772
Grand total	31,055,302	15,612,843	25,702,255	72,370,400

SALMON CANNING.

CHANGES IN CANNERIES.

The year was marked by a number of changes in the ownership and operation of canneries and also by the opening of new plants. In southeast Alaska a company, known as the Alaska Consolidated Canneries, was organized to operate the Tee Harbor, Chomley, and Yes Bay canneries of the Alaska Pacific Fisheries, the Quadra and Rose Inlet canneries of the Southern Alaska Canning Co., and the Tenakee cannery of the Columbia Salmon Co. The A. & P. Products Corporation leased the Ford Arm cannery of the Deep Sea Salmon Co. and the Heceta Island cannery of Swift-Arthur-Crosby

Co. The J. D. Roop Co. operated the plant of the Standard Salmon Packers (Inc.) at Tenakee; A. P. Wolf & Co. leased the plant of the Sitka Packing Co. at Sitka; and the Mitkof Island Packing Co. continued to operate the Petersburg cannery of the Petersburg Packing Corporation. The Noyes Island Packing Co. was reorganized as the Steamboat Bay Packing Co. The Stuart Packing Corporation became the owner of the floating cannery of the Mutual Packing Co. The Sea-Coast Packing Co. purchased the Craig cannery of the Columbia Salmon Co.

In central Alaska the Emel Packing Co. operated the Valdez Packing Co.'s cannery at Valdez, the Star Canning Co. took over the floating cannery of the Hayes-Graham Fish Co., the cannery of the Hillery-Scott Co. at Cordova was transferred to the Cordova Packing Co., and the Snug Harbor cannery of the Surf Packing Co. was operated by the Polar Fisheries Co. The Cordova cannery of the Pioneer Packing Co. is now listed under the name of the Pioneer Sea Foods Co., and the Seldovia Canning Co. was succeeded by the Seldovia Packing Co. For operating purposes the Carlisle Packing Co. and the Canoe Pass Packing Co. consolidated and used the Cordova plant of the former.

In western Alaska the floating plant of the Carlisle Packing Co., previously operated at Kwiguk Slough at the mouth of the Yukon River, was moved to Koggiung River, on Bristol Bay.

NEW CANNERIES.

Fifteen new or heretofore unlisted canneries were operated in Alaska in 1922. Of these six were located in southeast Alaska, as follows: A. & P. Products Corporation, at Hidden Inlet on the site formerly occupied by the cannery of the Hidden Inlet Canning Co.; Big Harbor Packing Co., at Craig; Ness Fish Co., at Petersburg; Red Salmon Packers Association, floating cannery *Retriever*, at Dry Bay and later at Ketchikan; R. J. Peratovich, at Bay View; and the Dobbins Packing Co., a floating plant at Petersburg for salmon and crabs.

Central Alaska is credited with six new canneries, located as follows: Anchorage Packing Co., at Anchorage; Kamishak Canning Co., at Kamishak Bay; Kodiak Island Fishing and Packing Co., at Seward; North Coast Packing Co., at Ninilchik; Robinson Packing Corporation, floating cannery *Azalea*, at Zachar Bay; and Hopp & Danielsen, at Uganik Bay.

One new cannery was opened in western Alaska at Ugashik River by the International Packing Co., which operated the motor ship *Santa Flavia* as a floating plant. After the close of the season on Bristol Bay this cannery was moved to Uyak to pack humpback salmon. W. F. O'Connor and Charles Homeier put up small packs of canned salmon on the Yukon River for local use; their plants have not been listed heretofore.

CANNERIES NOT OPERATED.

Forty-six canneries were closed during the season, of which three are probably permanently out of business—the F. H. Madden cannery at Abercrombie abandoned by reason of the enforcement of

regulations for the protection of the Copper River salmon run, the Ketchikan Packing Company's cannery sold under bankruptcy proceedings, and the small plant of E. R. Strand, near Petersburg. Including these three, the list is as follows:

Admiralty Packing Co	Pybus Bay.
Alaska Sanitary Packing Co	Cape Fanshaw.
Alaska Salmon & Herring Packers	Tyee.
Alaska Union Fisheries (Inc.)	Port Conclusion.
American Packing Co	Juneau.
Astoria & Puget Sound Canning Co	Excursion Inlet.
Baranof Packing Co	Red Bluff Bay.
Cape Fanshaw Fish & Packing Co	Cape Fanshaw.
John L. Carlson & Co	Auk Bay.
Chilkat Packing Co	Haines.
Canoe Pass Packing Co	Shepard Point.
Central Alaska Fisheries	Drier Bay.
Fidalgo Island Packing Co	Bay of Pillars.
	Herendeen Bay.
Hood Bay Packing Co	Hood Bay.
Hoonah Packing Co	Gambier Bay.
Karheen Packing Co	Karheen.
Ketchikan Packing Co	Ketchikan.
Kenai Packing Co	Drier Bay.
King Salmon Fisheries Co	Unakwik Inlet.
Libby, McNeill & Libby	Lockanok.
F. H. Madden	Abercrombie.
Marathon Fishing & Packing Co	Cape Fanshaw.
Midnight Sun Packing Co	Kotzebue Sound.
Nelson Lagoon Packing Co	Nelson Lagoon.
Northern Packing Co	Juneau.
Northwestern Fisheries Co	Dundas Bay.
	Hunter Bay.
	Kenai.
	Orca.
	Quadra.
	Roe Point.
	Santa Ana.
	Seldovia.
	Shakan.
Pacific American Fisheries	Excursion Inlet.
Pavlof Harbor Packing Co	Pavlof Harbor.
Petersburg Packing Corporation	Washington Bay.
Phoenix Packing Co	Herendeen Bay.
Point Warde Packing Co	Point Warde.
Revilla Packing Co	Ketchikan.
San Juan Fishing & Packing Co	Seward.
Southern Alaska Canning Co	Big Port Walter.
E. R. Strand	Wrangell Narrows.
Todd Packing Co	Todd.
G. W. Hume Co	Union Bay.

TOTAL CANNERIES OPERATED.

In 1922 there were 123 canneries operated in Alaska, of which 57 were located in southeast Alaska, 36 in central Alaska, and 30 in western Alaska. This is an increase of 40 over the number operated in 1921.

Companies canning salmon in Alaska, number and location of canneries operated, and number of pound nets owned by each, 1922.

[New canneries indicated by (*).]

Company.	Canneries.		Pound nets.		
	Number.	Location.	Driven.	Floating.	Total.
Southeast Alaska:					
Alaska Consolidated Canneries	6	Chomley	3	4	7
		Tenakee	2	2	4
		Rose Inlet	1	3	4
		Boca de Quadra	4	2	6
		Tee Harbor	2	4	6
		Yes Bay	3	4	7
Alaska Fish Co	1	Waterfall	1	1	2
Alaska Herring & Sardine Co	1	Port Walter	2	9	11
Alaska Packers Association	2	Loring	5	3	8
		Wrangell	1	5	6
A. & P. Products Corporation	3	Ford Arm		5	5
		Heceta Island		5	5
		Hidden Inlet*	2	2	4
Alaska Sanitary Packing Co	1	Wrangell	2		2
Annette Island Packing Co	1	Metlakatla			
Auk Bay Salmon Canning Co	1	Auk Bay	1	2	3
F. C. Barnes Co	1	Lake Bay	1		1
Beauclaire Packing Co	1	Port Beauclerc			
Beegle Packing Co	1	Ketchikan	2		2
Big Harbor Packing Co	1	Craig*			
Burnett Inlet Packing Co	1	Burnett Inlet		3	3
Deep Sea Salmon Co	1	Port Althorp		13	13
Dobbins Packing Co	1	Petersburg (floating)*			
Douglas Island Packing Co	1	Douglas			
Fidalgo Island Packing Co	1	Ketchikan	8		8
George Inlet Packing Co	1	George Inlet	2		2
Haines Packing Co	1	Letinkof Cove			
P. E. Harris & Co	1	Hawk Inlet	3	6	9
Hetta Packing Co	1	Coppermount			
Hidden Inlet Canning Co	1	Hood bay			
Hoonah Packing Co	1	Hoonah	21	4	25
G. W. Hume Co	1	Scow Bay	2		2
Libby, McNeill & Libby	2	Taku Harbor	12		12
		Yakutat			
Mitkof Island Packing Co	1	Petersburg	6	4	10
Mount Baker Packing Co	1	Red Bluff Bay			
Mountain Point Packing Co	1	Wrangell Narrows	1		1
George T. Myers & Co	1	Chatham	4	4	8
Ness Fish Co	1	Petersburg*			
North Pacific Trading & Packing Co	1	Klawak	1	2	3
Northwestern Fisheries Co	1	Kasaan	8	2	10
Red Salmon Packers Association	1	(Floating)*			
Pure Food Fish Co	1	Ketchikan	2		2
Pyramid Packing Co	1	Sitka		2	2
R. J. Peratovich	1	Bay View*			
J. D. Reop Co	1	Tenakee	2	2	4
Sea-Coast Packing Co	1	Craig	1	1	2
Sanborn Cutting Co	1	Kake		4	4
J. L. Smiley & Co	1	Ketchikan	3	2	5
Starr-Collinson Packing Co	1	Moira Sound		2	2
Stuart Packing Corporation	1	Ketchikan (floating)			
Steamboat Bay Packing Co	1	Noyes Island			
Sunny Point Packing Co	1	Ketchikan	5		5
Thlinket Packing Corporation	1	Funter Bay	4	6	10
The Trading Union, Inc	1	Petersburg			
Ward's Cove Packing Co	1	Ward Cove	2		2
A. P. Wolf & Co	1	Sitka			
Central Alaska:					
Alaska Packers Association	4	Alitak	6	1	7
		Chignik	3		3
		Larsen Bay			
		Kasilof	16		16
Alaska Sea Food Co	1	Point Whitshed			
Alitak Packing Co	1	Lazy Bay	4		4
Anchorage Packing Co	1	Anchorage*	5		5
Arctic Packing Co	1	English Bay			
Bainbridge Fisheries Co	1	Evans Island			
Carlisle-Canoe Pass Packing Co	1	Cordova		1	1
Columbia River Packers' Association	1	Chignik	3		3
Cordova Packing Co	1	Cordova			
Copper River Packing Co	1	McClure Bay	2		2
Emel Packing Co	1	Valdez	1		1
Eyak River Packing Co	1	Eyak River			
Fidalgo Island Packing Co	1	Port Graham	12		12

Companies canning salmon in Alaska, number and location of canneries operated, and number of pound nets owned by each, 1922—Continued.

Company	Canneries.		Pound nets.		
	Number.	Location.	Driven.	Floating.	Total.
Central Alaska—Continued.					
P. E. Harris & Co.	1	Isanotski Strait	4		4
Hoonah Packing Co.	1	Bering River			
Hopp and Danielsen	1	Uganik Bay *			
Kadiak Fisheries Co.	1	Kodiak	1		1
Kamishak Canning Co.	1	Kamishak Bay *			
Katmai Packing Co.	1	Uzinki			
Kodiak Island Fishing and Packing Co.	1	Seward *			
Libby, McNeill & Libby	1	Kenai River	16		16
Moore Packing Co.	1	Orca Inlet	1		1
Northwestern Fisheries Co.	2	Chignik	3		3
		Uyak			
North Coast Packing Co.	1	Ninilchik *	2		2
Pacific American Fisheries	2	Ikatan	8		8
		King Cove	9		9
Pioneer Sea Foods Co.	1	Cordova	2		2
Polar Fisheries Co.	1	Snug Harbor	4		4
Robinson Packing Corporation	1	(Floating) *			
Seldovia Packing Co.	1	Seldovia	2		2
Shumagin Packing Co.	1	Squaw Harbor	4		4
Star Canning Co.	1	(Floating)			
Western Alaska:					
Alaska Packers Association	9	Kvichak River (2)			
		Naknek River (3)			
		Nushagak River (2)			
		Egegik River			
		Ugashik River			
Alaska-Portland Packers' Association	2	Naknek			
		Nushagak	3		3
Alaska Salmon Co.	1	Wood River			
Bristol Bay Packing Co.	1	Koggiung			
Carlisle Packing Co.	1	Koggiung River			
Columbia River Packers' Association	1	Nushagak Bay			
Everett Packing Co.	1	Herendeen Bay			
Charles Homeier	1	Mountain Village *			
International Packing Co.	1	Ugashik (floating) *			
Libby, McNeill & Libby	5	Ekuk			
		Koggiung			
		Libbyville			
		Nushagak			
		Egegik River			
Naknek Packing Co.	1	Naknek River			
Northwestern Fisheries Co.	2	Naknek River			
		Nushagak			
W. F. O'Connor	1	Andreafsky *			
Pacific American Fisheries	1	Port Moller	6		6
Red Salmon Canning Co.	2	Naknek River			
		Ugashik River			

LOSSES AND DISASTERS.

The loss of property and apparatus in the salmon industry in 1922 totaled $253,470, the most important item being the Alaska-Portland Packers' Association's bark *Berlin* (1,416 tons), valued at $114,768, which went ashore at Egegik Flats May 17. There were no lives lost. In the whole of Alaska 10 people were killed in this industry, 4 of whom were drowned. Of the total number 4 were fishermen, 1 was a transporter, and 5 were shoresmen.

STATISTICS.

In 1922, 123 canneries were operated in Alaska, as compared with 83 in 1921. These represented an active investment of $45,207,557, or $11,961,265 more than in 1921. The increase by districts was: Southeast Alaska, $8,394,097; central Alaska, $2,766,989; and western Alaska, $800,179. Employment was given to 17,697 persons, or

4,711 more than in 1921. The increase in numbers was: Whites 2,234, natives 1,174, Chinese 332, Japanese 275, Filipinos 563, Mexicans 5, Negroes 44, and miscellaneous 84.

A total of 4,501,652 cases of salmon was packed in 1922, valued at $29,787,193. This is an increase over the 1921 pack of 1,904,826 cases, or approximately 73 per cent, and of $10,154,449, or approximately 52 per cent. This increase was largely due to the increased run of humpbacks, which produced 1,658,423 cases, having a value of $7,189,494, as compared with 423,984 cases in 1921, valued at $1,788,778. Other species increased as follows: Cohos from 106,555 to 175,993 cases, chums from 255,495 to 565,918 cases, and reds from 1,765,798 to 2,070,658 cases. Kings decreased from 44,994 to 30,660 cases. By districts, southeast Alaska increased from 803,071 to 2,018,743 cases, central Alaska from 643,099 to 988,143 cases, and western Alaska from 1,150,656 to 1,494,766 cases. In southeast Alaska the increase was 1,215,672 cases, or approximately 151 per cent.

Investment in the Alaska salmon-canning industry in 1922.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Canneries operated	57	$5,183,390	36	$2,815,986	30	$5,335,954	123	$13,335,330
Working capital		5,680,677		3,148,248		4,252,163		13,081,088
Wages paid		2,319,459		1,866,584		3,849,181		8,035,224
Vessels:								
Power, over 5 tons	202	1,457,616	88	799,385	79	1,526,263	369	3,783,264
Net tonnage	4,108		2,279		9,590		15,977	
Sailing	1	45,000	7	360,000	31	1,148,740	39	1,553,740
Net tonnage	1,974		10,900		48,561		61,435	
Barges	3	71,871					3	71,871
Net tonnage	2,770						2,770	
Launches, under tonnage	66	68,063	145	179,169	57	143,189	268	390,421
Boats, row and sail	778	188,077	709	102,415	1,265	505,108	2,752	795,600
Lighters, scows and houseboats	320	307,834	168	188,181	186	477,874	674	973,889
Pile drivers and pile pullers	49	336,236	34	157,835	23	51,765	106	545,836
Apparatus:								
Beach seines	52	37,210	97	38,226	4	1,500	153	76,936
Fathoms	6,845		14,250		400		21,495	
Purse seines	255	154,580	16	13,250	17	27,700	288	195,530
Fathoms	41,150		2,915		4,150		48,515	
Gill nets	263	24,493	989	93,418	1,937	446,871	3,189	564,782
Fathoms	27,325		69,380		267,335		364,040	
Pound nets, driven	137	855,556	113	608,317	9	35,000	259	1,498,873
Pound nets, floating	109	301,973	2	2,800			111	304,773
Wheels					2	400	2	400
Total		17,032,035		10,373,814		17,801,708		45,207,557

Persons engaged in the Alaska salmon-canning industry in 1922.

Occupation and race.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Fishermen:				
Whites	930	994	2,365	4,289
Natives	1,044	401	66	1,511
Japanese	----------	1	----------	1
Miscellaneous [1]	18	8	----------	26
Total	1,992	1,404	2,431	5,827
Shoresmen:				
Whites	1,232	912	1,511	3,655
Natives	1,260	639	219	2,118
Chinese	380	313	526	1,219
Japanese	444	345	96	885
Filipinos	645	300	575	1,520
Mexicans	67	92	1,203	1,362
Negroes	6	20	121	147
Miscellaneous [1]	5	19	77	101
Total	4,039	2,640	4,328	11,007
Transporters:				
Whites	356	215	229	800
Natives	17	24	1	42
Negroes	----------	----------	5	5
Miscellaneous [1]	15	1	----------	16
Total	388	240	235	863
Total:				
Whites	2,518	2,121	4,105	8,744
Natives	2,321	1,064	286	3,671
Chinese	380	313	526	1,219
Japanese	444	346	96	886
Filipinos	645	300	575	1,520
Mexicans	67	92	1,203	1,362
Negroes	6	20	126	152
Miscellaneous [1]	38	28	77	143
Grand total	6,419	4,284	6,994	17,697

[1] Koreans, Porto Ricans, Kanakas, etc.

Output and value of canned salmon in Alaska in 1922.[1]

Product.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
Coho, or silver:	*Cases.*	*Value.*	*Cases.*	*Value.*	*Cases.*	*Value.*	*Cases.*	*Value.*
½-pound flat	20,013	$151,666	2,224	$17,039	----------	----------	22,237	$168,705
1-pound flat	10,773	63,515	1,291	8,005	35	$166	12,099	71,686
1-pound tall	91,861	462,365	36,919	192,234	12,877	67,800	141,657	722,399
Total	122,647	677,546	40,434	217,278	12,912	67,966	175,993	962,790
Chum, or keta:								
½-pound flat	3,698	21,228	----------	----------	----------	----------	3,698	21,228
1-pound flat	6,185	25,693	----------	----------	----------	----------	6,185	25,693
1-pound tall	414,383	1,640,135	91,239	362,440	50,413	202,044	556,035	2,204,619
Total	424,266	1,687,056	91,239	362,440	50,413	292,044	565,918	2,251,540
Humpback, or pink:								
½-pound flat	30,725	197,953	12,011	75,745	----------	----------	42,736	273,698
1-pound flat	28,148	134,268	2,731	13,655	----------	----------	30,879	147,923
1-pound tall	1,273,679	5,461,536	298,226	1,251,399	12,903	54,938	1,584,808	6,767,873
Total	1,332,552	5,793,757	312,968	1,340,799	12,903	54,938	1,658,423	7,189,494
King, or spring:								
½-pound flat	2,695	30,640	1,022	13,341	53	742	3,770	44,723
1-pound flat	1,735	15,209	2,067	20,538	165	2,002	3,967	37,749
1-pound tall	1,703	11,448	7,076	53,168	14,144	100,585	22,923	165,201
Total	6,133	57,297	10,165	87,047	14,362	103,329	30,660	247,673
Red, or sockeye:								
½-pound flat	57,783	779,582	89,603	1,257,544	24,510	384,901	171,896	2,422,027
1-pound flat	17,579	171,509	59,799	614,403	44,071	437,530	121,449	1,223,442
1-pound tall	57,783	530,278	383,935	3,447,679	1,335,595	11,512,270	1,777,313	15,490,227
Total	133,145	1,481,369	533,337	5,319,626	1,404,176	12,334,701	2,070,658	19,135,696
Grand total	2,018,743	9,697,025	988,143	7,327,190	1,494,766	12,762,978	4,501,652	29,787,193

[1] Cases containing one-half-pound cans have been reduced one-half in number, and thus, for the purpose of affording fair comparison, all are put upon the basis of 48 one-pound cans per case.

Output of canned salmon in Alaska, 1916 to 1922.[1]

Product.	1916	1917	1918	1919	1920	1921	1922	Total.
Coho, or silver:	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
½-pound flat	13,145	30,412	26,238	9,719	8,915	4,084	22,237	114,750
1-pound flat	8,191	362	12,786	10,438	10,746	7,918	12,099	62,540
1-pound tall	240,573	162,457	179,934	212,713	172,424	91,553	141,657	1,201,311
Total	261,909	193,231	218,958	232,870	192,085	106,555	175,993	1,381,601
Chum, or keta:								
½-pound flat	1,423	26,760	3,559	3,981	53	608	3,698	40,082
1-pound flat	.....	2,530	2,996	.....	46,167	.....	6,185	57,878
1-pound tall	722,692	877,457	1,358,405	1,361,582	987,297	254,887	556,035	6,118,365
Total	724,115	906,747	1,364,960	1,365,563	1,033,517	255,495	565,918	6,216,315
Humpback, or pink:								
½-pound flat	41,491	91,403	63,557	28,185	18,970	1,292	42,736	287,634
1-pound flat	14,796	6,014	20,215	7,553	76,017	.....	30,879	155,474
1-pound tall	1,681,506	2,199,559	2,355,182	1,575,870	1,498,133	422,692	1,584,808	11,317,750
Total	1,737,793	2,296,976	2,438,954	1,611,608	1,593,120	423,984	1,658,423	11,760,858
King, or spring:								
½-pound flat	2,617	12,793	6,000	7,584	10,196	4,061	3,770	47,201
1-pound flat	3,804	5,133	5,267	11,532	18,319	19,192	3,967	67,214
1-pound tall	59,452	43,845	37,959	76,870	81,488	21,741	22,923	344,278
Total	65,873	61,951	49,226	95,986	110,003	44,994	30,660	458,693
Red, or sockeye:								
½-pound flat	81,565	124,309	137,008	122,236	101,716	60,831	171,896	799,561
1-pound flat	86,395	89,612	151,864	110,491	120,147	71,108	121,449	751,066
1-pound tall	1,936,971	2,274,460	2,244,865	1,044,934	1,278,875	1,633,859	1,777,313	12,191,277
2-pound nominals	6,006	.....	.....	.....	.....	.....	.....	6,006
Total	2,110,937	2,488,381	2,533,737	1,277,661	1,500,738	1,765,798	2,070,658	13,747,910
Grand total	4,900,627	5,947,286	6,605,835	4,583,088	4,429,463	2,596,826	4,501,652	33,565,377

[1] The number of cases shown has been put upon the common basis of 48 one-pound cans per case.

Average annual price per case of 48 one-pound cans of salmon, 1912 to 1922.

Product.	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Coho, or silver	$4.44	$3.45	$4.39	$4.31	$5.34	$8.76	$9.15	$11.27	$9.13	$5.63	$5.47
Chum, or keta	2.37	2.21	3.37	2.59	3.34	6.14	6.27	6.82	4.19	3.68	3.98
Humpback, or pink	2.55	2.58	3.50	2.78	3.64	6.44	6.58	8.35	5.47	4.21	4.34
King, or spring	5.37	4.04	5.01	4.63	5.36	10.40	9.85	13.13	10.97	10.22	8.08
Red, or sockeye	5.45	4.54	5.58	5.82	6.04	9.48	9.44	12.98	13.05	8.96	9.24

MILD CURING OF SALMON.

In 1922 there were employed in this industry 1,243 whites and 61 natives, exclusive of the independent trollers of southeast Alaska. This is an increase of 855 persons. The southeastern district, because of its nearness to market, produced the bulk of mild-cured salmon. The industry in 1922 showed an investment of $1,572,025, as compared with $613,516 in 1921, an increase of $958,509, and produced a total of 5,283 tierces of mild-cured salmon, valued at $821,169, of which 5,200 tierces were kings and 83 cohos. Corresponding figures for 1921 were 3,556 tierces, valued at $608,218, of which 3,530 tierces were kings and 26 cohos.

Investment, persons engaged, and products of Alaska salmon mild-curing industry in 1922.

Items.	Number.	Value.	Items.	Number.	Value.
INVESTMENT.			PERSONS ENGAGED—con.		
Plants	6	$6,600	Shoresmen:		
Operating capital		403,020	Whites	144	
Vessels:			Natives	9	
Power, over 5 tons	18	75,900	Total	153	
Net tonnage	263				
Barges	2	17,000			
Launches, under 5 tons [1]	1,013	1,014,800	Transporters:		
Other boats and skiffs	33	8,455	Whites	31	
Lighters	6	9,000	Natives	2	
Apparatus:			Total	33	
Gill nets (5,250 fathoms)	35	7,750			
Lines	5,790	29,500	Grand total	1,304	
Total		1,572,025	PRODUCTS (POUNDS).		
PERSONS ENGAGED.			Coho, or silver [2]	66,400	$6,548
Fishermen:			King, or spring [3]	4,199,650	814,621
Whites	1,068		Total	4,266,050	821,169
Natives	50				
Total	1,118				

[1] Includes 1,000 trolling launches, valued at $1,000,000. [2] 83 tierces. [3] 5,200 tierces.

SALMON PICKLING.

In 1922 the investment in salmon pickling was $510,998, a gain of $77,003 over 1921, when the investment was $433,995, the greater part being in western Alaska. The investment in 1922 was confined to central Alaska, $123,779, and western Alaska, $387,219. In 1922 there were employed 250 persons as compared with 195 in 1921. The production increased from 10,082 barrels in 1921, with a value of $179,414, to 17,925½ barrels in 1922, with a value of $284,015, an increase of approximately 77 per cent in quantity and 58 per cent in value.

Investment, persons engaged, and products of Alaska salmon-pickling industry in 1922, by districts.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
INVESTMENT.	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Salteries	.....	.....	7	$88,600	8	$76,500	15	$165,100
Operating capital	.....	.....	.....	19,609	.....	159,627	.....	179,236
Vessels:								
Power, over 5 tons	.....	.....	1	4,500	8	38,491	9	42,991
Net tonnage	.....	.....	15	.....	116	.....	131	.....
Sailing	.....	.....	.....	.....	3	60,000	3	60,000
Net tonnage	.....	.....	.....	.....	1,412	.....	1,412	.....
Launches	.....	.....	6	3,800	5	9,900	11	13,700
Boats, gill net and row	.....	.....	18	1,090	71	21,225	89	22,315
Lighters and pile drivers	.....	.....	4	2,050	10	9,525	14	11,575
Apparatus:								
Haul seines	.....	.....	6	1,170	1	50	7	1,220
Fathoms	.....	.....	360	.....	50	.....	410	.....
Gill nets	.....	.....	8	460	103	11,271	111	11,731
Fathoms	.....	.....	250	.....	8,900	.....	9,150	.....
Pound nets, driven	.....	.....	5	2,500	.....	.....	5	2,500
Wheels	.....	.....	.....	.....	5	630	5	630
Total	.....	.....	.....	123,779	.....	387,219	.....	510,998
PERSONS ENGAGED.								
Fishermen:								
Whites	.....	.....	23	.....	85	.....	108	.....
Natives	.....	.....	5	.....	27	.....	32	.....
Total	.....	.....	28	.....	112	.....	140	.....
Shoresmen:								
Whites	.....	.....	12	.....	65	.....	77	.....
Natives	.....	.....	3	.....	16	.....	19	.....
Mexicans	.....	.....	.....	.....	13	.....	13	.....
Total	.....	.....	15	.....	94	.....	109	.....
Transporters: White	.....	.....	.....	.....	1	.....	1	.....
Grand total	.....	.....	43	.....	207	.....	250	.....
PRODUCTS (BARRELS).[1]								
Coho, or silver	749	$10,915	21	285	67	914	837	12,114
Chum, or keta	.....	.....	31	600	55	901	86	1,501
Humpback, or pink	.....	.....	165½	1,660	.....	.....	165½	1,660
King, or spring	1	10	35½	748	319½	5,754	356	6,512
Red, or sockeye	.....	.....	1,458	27,753	15,023	234,475	16,481	262,228
Total	750	10,925	1,711	31,046	15,464½	242,044	17,925½	284,015

[1] Each barrel holds 200 pounds of fish.

SALMON FREEZING.

In 1922 the four companies reporting the preparation of frozen salmon in southeast Alaska produced 3,791,634 pounds, valued at $255,343, and one in western Alaska produced 57,519 pounds, valued at $5,751, a total production of 3,849,153 pounds, valued at $261,094. There were no operators in central Alaska. The total production for 1921 was 1,506,074 pounds, valued at $127,442, making an increase for 1922 of 2,343,079 pounds, or approximately 156 per cent in quantity, and of $133,652, or approximately 105 per cent in value.

Quantity and value of salmon frozen in Alaska in 1922, by species.

Species.	Pounds.	Value.
Coho, or silver	839,640	$48,137
Chum, or keta	236,679	9,467
Humpback, or pink	1,023,707	20,474
King, or spring	1,548,474	162,951
Red, or sockeye	200,653	20,065
Total	3,849,153	261,094

FRESH SALMON.

There was a material decrease in the fresh-salmon trade in 1922 as compared with 1921. The number of persons engaged dropped from 20 to 7 and the production from 9,103,104 pounds, with a value of $418,265, to 3,802,729 pounds, with a value of $271,869. This is a decrease of approximately 58 per cent in the number of pounds and 35 per cent in value. The investment was $35,541 in 1922 as compared with $55,027 in 1921, a decrease of $19,486.

Investment, persons engaged, and products of the Alaska fresh-salmon industry in 1922.

Items.	Number.	Value.
INVESTMENT.		
Operating capital	.....	$19,316
Floating equipment	.....	12,525
Apparatus:		
Purse seines	1	200
Fathoms	85	.....
Traps, pile	1	3,500
Total	.....	35,541
PERSONS ENGAGED.		
Fishermen	2	.....
Transporters	5	.....
Total	7	.....
PRODUCTS (POUNDS).		
Coho, or silver	619,930	25,740
Chum, or keta	126,847	4,011
Humpback, or pink	637,338	7,085
King, or spring	2,072,774	202,279
Red, or sockeye	345,840	32,754
Total	3,802,729	271,869

DRYING AND SMOKING OF SALMON.

In 1922 nine firms reported a production of 815,550 pounds of dried salmon, valued at $145,544, as compared with 8,533 pounds in 1921, valued at $979. The Juneau Cold Storage Co. reported a production of 10,000 pounds of kippered salmon, with a value of $1,500, and two operators produced 1,600 pounds of beleke, valued at $480. Two firms dry-salted 79,400 pounds, with a value of $940. The total quantity of dried, kippered, and dry-salted salmon and beleke was 906,550 pounds, with a value of $148,464.

FIG. 9.—Herring station and homestead, Halibut Cove, Cook Inlet.

FIG. 10.—Cannery in Cook Inlet district.

Quantity and value of dried, kippered, and dry-salted salmon in Alaska in 1922, by species.

Species.	Dried.		Kippered.		Dry salted.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
Coho, or silver	11,750	$620				
Chum, or keta	546,250	105,275				
Humpback, or pink	40,600	1,624	[1] 600	$180	75,000	$500
King, or spring	7,950	865	[2] 11,000	1,800	4,400	440
Red, or sockeye	209,000	37,160				
Total	815,550	145,544	11,600	1,980	79,400	940

[1] Beleke. [2] Includes 1,000 pounds beleke, valued at $300.

SALMON BY-PRODUCTS.

The two firms producing oil and fertilizer from salmon offal and scrap fish in 1921 continued their activities in 1922 with an increased investment and output. They are the Alaska Reduction Co., at Hawk Inlet, and the Petersburg By-Products Co., at Scow Bay. The total investment in 1922 was $183,017, and 29 persons were employed. The products were 387 tons of fertilizer, valued at $23,438, and 12,989 gallons of oil, valued at $5,015. The investment in 1921 was $141,319, with 27 persons employed, and the products were 232 tons of fertilizer, valued at $13,920, and 15,010 gallons of oil, valued at $4,102. The value of the products in 1922 was $10,431 more than the value in 1921.

HERRING FISHERY.

This industry shows a further expansion in 1922 as compared with 1921, not only in number of operators but in volume of products. Practically all the pickled herring was Scotch cured, the pack was of better quality, and sales were better and more promptly made than in past seasons. There is still room for improvement along this line, and the market will be better as the products meet the requirements of the trade.

The tendency of the present packers engaged in this business has been to locate in proved localities, which has, in most instances, resulted in congestion. Scarcely anything in the way of prospecting for new fishing grounds has been done.

STATISTICAL SUMMARY.

In 1922 the herring industry of Alaska showed an investment of $3,367,841, as compared with $1,512,029 in 1921, an increase of $1,855,812. Nine plants were operated in addition to those in operation in 1921, making a total of 22. Employment was given to 1,280 persons, while in 1921 only 445 were employed. The total value of the output in 1922 was $2,329,116, as against $934,044 in 1921, an increase of $1,395,072, or approximately 149 per cent. Scotch-cured herring increased from 14,523,441 pounds in 1921 to 35,995,450 pounds in 1922. Losses in this industry aggregated $25,000, of which $10,000 was a vessel owned by the Alaska Sea Food Products Co., and $10,000 the saltery of the Nildenrich Packing Co., which was destroyed by fire.

Investment, persons engaged, and products of Alaska herring fishery in 1922, by districts.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
INVESTMENT.	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Plants operated	6	$296,306	15	$546,396	1	$8,879	22	$851,581
Operating capital	.....	415,966	.....	1,473,687	.....	9,543	.....	1,899,196
Vessels:								
Power, over 5 tons	22	128,000	63	338,050	.....	.....	85	466,050
Net tonnage	745	.....	1,660	.....	.....	.....	2,405	.....
Launches, under 5 tons	1	200	8	6,650	1	2,076	10	8,926
Boats, row and seine	29	3,150	82	4,615	10	950	121	8,715
Lighters and scows	1	1,000	11	9,800	1	400	13	11,200
Pile drivers	1	5,000	3	6,000	.....	.....	4	11,000
Apparatus:								
Beach seines	.....	.....	8	11,000	.....	.....	8	11,000
Fathoms	.....	.....	930	.....	.....	.....	930	.....
Purse seines	10	22,928	41	73,440	6	1,775	57	98,143
Fathoms	1,470	.....	7,010	.....	80	.....	8,560	.....
Gill nets	.....	.....	6	1,450	58	580	64	2,030
Fathoms	.....	.....	180	.....	580	.....	760	.....
Total	.....	872,550	.....	2,471,088	.....	24,203	.....	3,367,841
PERSONS ENGAGED.								
Fishermen:								
Whites	94	.....	332	.....	4	.....	430	.....
Natives	7	.....	14	.....	10	.....	31	.....
Total	101	.....	346	.....	14	.....	461	.....
Shoresmen:								
Whites	177	.....	534	.....	2	.....	713	.....
Natives	48	.....	53	.....	.....	.....	101	.....
Total	225	.....	587	.....	2	.....	814	.....
Transporters:								
Whites	.....	.....	4	.....	.....	.....	4	.....
Natives	.....	.....	1	.....	.....	.....	1	.....
Total	.....	.....	5	.....	.....	.....	5	.....
Grand total	326	.....	938	.....	16	.....	1,280	.....
PRODUCTS (POUNDS).								
Fresh for bait	300,000	3,000	524,600	5,246	.....	.....	824,600	8,246
Frozen for bait	1,803,415	14,734	860,600	8,606	.....	.....	2,664,015	23,340
Pickled for food, Scotch cure	7,290,009	373,961	28,616,841	1,650,352	88,600	6,662	35,995,450	2,030,975
Pickled for food, Norwegian cure	22,400	1,168	215,450	12,841	.....	.....	237,850	14,009
Dry-salted for food	.....	.....	240,000	9,600	.....	.....	240,000	9,600
Fertilizer	2,526,000	75,548	766,000	22,980	.....	.....	3,292,000	98,528
Oil [1]	333,941	112,463	91,300	31,955	.....	.....	425,241	144,418
Total	.....	580,874	.....	1,741,580	.....	6,662	.....	2,329,116

[1] Gallons.

HALIBUT FISHERY.

Owing to an oversupply of halibut at the beginning of the year, heavy storms, and a decrease in the productivity of some of the fishing grounds the halibut catch for 1922 did not total as much as in 1921. British Columbia ports received part of the catch, which was shipped thence to central and eastern markets.

STATISTICAL SUMMARY.

The investment in the halibut industry in 1922 was $1,839,910, an increase of $4,653 over that reported for 1921. Employment was given to 569 persons, compared with 452 in 1921. Independent ves-

sels making deliveries to Alaskan ports and their crews and property must be estimated in compiling these figures. The products of the halibut fishery entered through the ports of Alaska in 1922 were 11,075,237 pounds, valued at $1,034,967, as compared with 17,176,274 pounds in 1921, valued at $1,476,450.

Investment, persons engaged, and products of Alaska halibut fishery in 1922.

Items.	Number.	Value.	Items.	Number.	Value.
INVESTMENT.			PERSONS ENGAGED		
Vessels:			Whites	455	
Steam and gas	106	$1,114,000	Natives	112	
Net tonnage	2,383		Miscellaneous	2	
Launches	9	8,800	Total	569	
Scows	1	4,000			
Apparatus		21,725	PRODUCTS (POUNDS).		
Shore property		393,935	Fresh (including local)	7,886,764	$772,610
Cash capital		297,450	Frozen	3,188,473	262,357
Total		1,839,910	Total	11,075,237	1,034,967

COD FISHERY.

The cod industry of Alaska in 1922 partially recovered from the shrinkage in 1921. In the vessel fishery the Robinson Fisheries Co. restored the *Wawona* to the cod fleet and the Pacific Coast Codfish Co. put into service the *Charles R. Wilson*, but withdrew the *Maid of Orleans*. The North Star Fish Packing Co. used the power schooner *Northern King*. The Union Fish Co. withdrew the *Sequoia* from the fleet.

The only important shore stations operated in Alaska in 1922 were those of the Union Fish Co. and the Alaska Codfish Co. in the Shumagin Islands.

Alaska cod fleet in 1922.

Name.	Rig.	Net tonnage.	Operators.
City of Papeete	Schooner	370	Alaska Codfish Co., San Francisco, Calif.
Glendale	do	281	Do.
Maweema	do	392	Do.
S. N. Castle	do	464	Do.
Alasco	Power schooner	23	Do.
Alasco II	do	5	Do.
Alasco III	do	8	Do.
Alasco IV	do	14	Do.
Golden State	do	223	Union Fish Co., San Francisco, Calif.
Pirate	do	30	Do.
Progress	Schooner	115	Do.
Mary G	do	21	Do.
Louise	do	328	Do.
Martha	do	14	Do.
Union Flag	do	7	Do.
John A	do	235	Pacific Coast Codfish Co., Seattle, Wash.
Charles R. Wilson	do	328	Do.
Wawona	do	413	Robinson Fisheries Co., Anacortes, Wash.
Fanny Dutard	do	252	J. A. Matheson, Anacortes, Wash.
Northern King	Power schooner	7	North Star Fish Packing Co., Tacoma, Wash.

STATISTICAL SUMMARY.

The cod industry in 1922 showed an investment of $778,376, as compared with $781,665 in 1921. The number of persons employed was 357, or 25 more than in 1921. The production of cod was

6,134,649 pounds and 100 gallons of oil, all valued at $464,169, an increase over 1921 of 1,346,818 pounds in quantity and $6,849 in value.

Investments, persons engaged, and products of Alaska cod fishery in 1922.

Item.	Number.	Value.	Item.	Number.	Value.
INVESTMENT.			PRODUCTS (POUNDS).		
Value of shore stations		$150,930	Vessel catch:		
Cost of operations		133,817	Dry-salted cod	3,719,145	$243,601
Wages paid		136,316	Pickled cod	16,800	925
Vessels:			Tongues	11,860	1,186
Power, over 5 tons	7	102,134	Oil	[1] 100	100
Net tonnage	310		Total		245,812
Sailing	13	194,357			
Net tonnage	3,120		Shore station catch:		
Launches	91	42,161	Dry-salted cod	2,366,844	215,357
Dories	306	9,350	Stockfish	20,000	3,000
Pile drivers	2	250	Total	2,386,844	218,357
Apparatus:					
Seines (75 fathoms)	1	250	Recapitulation:		
Gill nets (75 fathoms)	1	195	Dry-salted cod	6,085,989	458,958
Lines	1,420	8,616	Pickled cod	16,800	925
Total		778,376	Stockfish	20,000	3,000
			Tongues	11,860	1,186
PERSONS ENGAGED.			Oil	[1] 100	100
Fishermen: White	313		Grand total		464,169
Shoresmen: White	19				
Transporters: White	25				
Total	357				

[1] Gallons.

WHALE FISHERY.

Whaling in Alaska in 1922 was carried on by two companies, the United States Whaling Co., at Port Armstrong, and the North Pacific Sea Products Co., at Akutan. The industry gave employment to 166 whites, 24 natives, 27 Japanese, and 3 Filipinos. The investment, consisting of plants, vessels, wages, and other operating costs, was $801,950. The number of whales captured was 445, of which 204 were finbacks, 95 humpbacks, 77 sulphur bottoms, and 69 sperm. The products were 904,359 gallons of oil, valued at $328,944; 3,092,480 pounds of fertilizer, valued at $78,974; 14,000 pounds of whalebone, valued at $1,400; and 500 pounds of ivory, valued at $200. The total value of all whale products was $409,618.

CLAMS.

In 1922 the production of clam products was 32,290 cases, valued at $185,007, as compared with 1,420 cases, valued at $9,940, in 1921, an increase of 30,870 cases in quantity and $175,067 in value.

Products of the Alaska clam industry in Alaska in 1922.

Item.	Cases.	Value.
Minced:		
½-pound cans	18,078	$74,520
10-ounce cans	11,732	89,634
1-pound cans	1,046	9,249
Whole:		
1-pound cans	1,434	11,604
Total	32,290	185,007

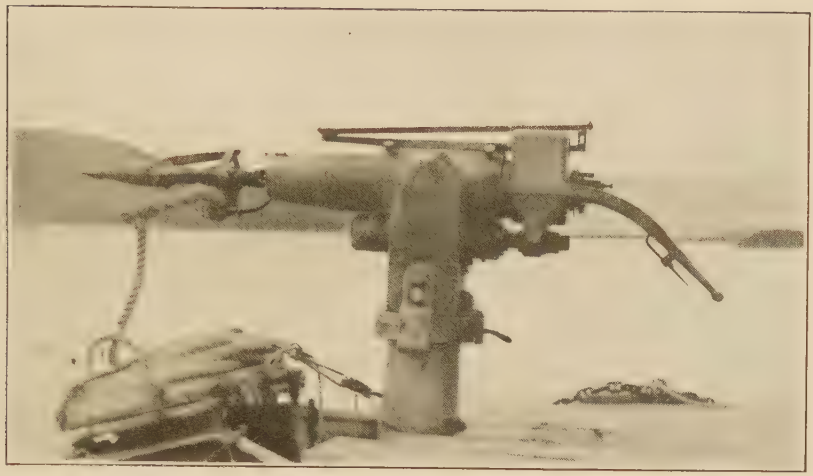


FIG. 11.—Whaling gun mounted at bow of vessel.

FIG. 12.—Hauling out whale at shore station, western Alaska.

SHRIMPS.

Three companies, the Alaskan Glacier Sea Food Co., Olympic Fisheries Co., and Ness Fish Co., located at Petersburg, were engaged in the preparation of shrimps. The entire product consisted of fresh shrimp meat packed in 5-pound tin containers, which are filled by hand, sealed in a hand machine, and shipped in cold storage to Seattle. Immediately upon delivery at the packing houses the shrimps are immersed in hot water for a few minutes, thus cooking them slightly and facilitating removal of shells. The shelling is done by hand by Japanese and natives, who are paid by the pound for the meat prepared.

Employment was given to 16 whites, 79 natives, 3 Chinese, 11 Japanese, 3 Mexicans, and 1 Filipino, a total of 113, as compared with 111 in 1921. Wages aggregated $59,689, and other costs of operation totaled $53,902. The value of plants, vessels, and fishing apparatus was $49,520. The total investment in the industry in 1922 was $163,111, as compared with $147,814 in 1921. The output was 336,380 pounds of meat, valued at $126,690, as compared with 344,986 pounds in 1921, valued at $132,077. Losses in this industry in 1922 amounted to $7,648, of which $7,348 represents the value of products that spoiled for lack of cold-storage shipping facilities.

CRABS.

Three canneries handling crabs exclusively were operated in Alaska in 1922 and four other operators handled crabs incidental to other activities. The reported investment in the industry in 1922 was $129,976, as compared with $43,848 in 1921. Employment was given to 152 persons, as against 44 in 1921. The products consisted of 4,619 cases canned, valued at $46,231; 120 pounds fresh, valued at $48; and 383 dozen whole crabs in shell, valued at $1,100; a total of $47,379. The value of products in 1921 was $33,180.

TROUT.

Although there was no separate investment in the trout industry in 1922 there was reported a production of 64,727 pounds of fresh trout, valued at $5,266, and of 134 cases of preserved trout, valued at $648. Dolly Varden and steelhead were the only species taken. The total production in 1922 was 133,504 pounds, valued at $18,925.

Products of Alaska trout fishery in 1922.

Species.	Fresh.		Canned.	
	Pounds.	*Value.*	*Cases.*	*Value.*
Dolly Varden	49,483	$4,275		
Steelhead	15,244	991	134	$648
Total	64,727	5,266	134	648

MISCELLANEOUS FISHERY PRODUCTS.

Several products, incidental to other fishing operations, deserve mention. These include sablefish, flatfish, and ling-cod. In 1922 the total catch of sablefish was 49,167 pounds, valued at $1,538; of flatfish 12,255 pounds, valued at $367; and of ling-cod 1,327 pounds, valued at $26.

FUR-SEAL INDUSTRY.

PRIBILOF ISLANDS.

GENERAL ADMINISTRATIVE WORK.

In the calendar year 1922, 31,156 sealskins were taken on the Pribilof Islands. With the exception of the year 1918, when 34,890 skins were secured, the take was the largest since 1889. The washing and blubbering of sealskins on St. Paul Island, which was first undertaken on a commercial scale in 1921, was continued more extensively in 1922, when nearly 16,000 were so treated. Extensions were made to the washing and blubbering plant and to the St. Paul salt houses. Work on the new water system for St. Paul village was continued, and the building of a road suitable for motor trucks from that village to Northeast Point was undertaken. On St. George Island improvements were made to the village landings, new building construction was undertaken, and the electric lighting system was extended to include the entire village. The practice of feeding foxes on St. George Island was continued, and steps were taken to secure the services of an experienced man to develop the fox herds on both islands. The regular annual supplies were transported to the islands by a commercial vessel instead of by a Navy vessel. The Coast Guard maintained a patrol of the waters of the North Pacific Ocean and Bering Sea and in addition rendered the fur-seal service valuable aid by transporting passengers, miscellaneous freight, and mail. The bureau's vessel *Eider* made a number of trips from Unalaska to the Pribilofs in the winter and was kept steadily employed throughout the regular sealing season. The usual seal census was taken and included this season a count of all the pups on both islands.

OFFICIAL VISIT BY ASSISTANT SECRETARY OF COMMERCE.

In connection with a general trip to Alaska, an official party headed by Hon. C. H. Huston, Assistant Secretary of Commerce, visited the Pribilof Islands in July. Mr. Huston, accompanied by Ward T. Bower, field assistant, Bureau of Fisheries, Dr. Leonhard Stejneger, United States National Museum, Lieut. Ellis Reed-Hill, engineer officer, United States Coast Guard cutter *Mojave*, Joe L. Baker, special assistant, and Capt. C. E. Lindquist, arrived at St. George on the United States Coast Guard cutter *Algonquin* July 11 and after making an inspection of the station and seal life, proceeded to St. Paul Island where they arrived July 12. Dr. Stejneger and Captain Lindquist left on the *Algonquin* the same day. The others remained at St. Paul Island until July 19 when they took passage on the U. S. Coast Guard cutter *Mojave*. During the week at St. Paul Island close attention was given to all the details of the

station's work, particularly to sealing operations, which were at their height. A number of other members of Mr. Huston's party who did not go with him to the Pribilofs on the *Algonquin* arrived on the *Mojave* and were ashore at St. Paul for a brief period July 19.

PERSONNEL.

Superintendent A. H. Proctor, who had been detailed to the Washington office for a part of the winter of 1921–22, returned to the Pribilofs early in the spring by the Coast Guard cutter *Haida*, arriving at St. Paul Island April 25. Accompanying him were E. C. Johnston, storekeeper; A. Christoffersen, by-products expert; William A. Carter and Theodore C. Vick, sealing assistants; Charles Roof, Albert Harland, Joseph Movilla, Benjamin P. Gale, and Andrew Pearson, carpenters; and two Chinese cooks.

W. C. Allis, sealing assistant, left in May. Dr. Daniel L. Roland, who had been employed as dentist on St. Paul Island through the winter of 1921–22, went to St. George Island on duty in May and in June left for the States. Henry Mygatt, assistant to agent, and Edna C. Mygatt, school-teacher, left St. Paul Island for the States also in June.

William P. Zschorna, of the Fouke Fur Co., which dresses and dyes the Government's sealskins, and 12 assistants were detailed to St. Paul Island during the active sealing season to assist with the washing and blubbering of sealskins. G. Donald Gibbins, vice president of the Fouke Fur Co., was also at St. Paul Island for a few weeks in June and July.

In September the steamship *Brookdale* landed Lois L. Proctor and Harold W. Lashier, school-teachers, and Paul E. Moran, assistant to agent, at St. Paul Island, and Dr. George S. Lesher, physician, at St. George Island. Mr. Moran was later detailed to St. George Island for duty during the winter of 1922–23.

Leaving on the steamship *Brookdale* for the States in September were Henry D. Aller, agent and caretaker, E. C. Johnston, storekeeper, and two Chinese cooks, from St. Paul Island, and H. C. Scudder, storekeeper, and Dr. Wm. M. Murphy, physician, from St. George Island. A. Christoffersen left on the U. S. Coast Guard Cutter *Haida* in October. Four of the five carpenters left at various times during the season. Richard Culbertson was transferred from the position of school-teacher to that of sealing assistant. In December Dr. George B. Bowlby, who had tendered his resignation, was relieved by Dr. Robert E. Davis, who arrived on the *Eider*. Mrs. Catherine Davis was appointed nurse. Dr. Bowlby left St. Paul on the *Eider*.

PURCHASE AND TRANSPORTATION OF SUPPLIES.

The method of securing competitive bids for the general annual supplies required for the Pribilof Islands through the use of printed schedules, which has been followed uniformly for a number of years, was again employed in 1922. The supplies were shipped to the islands by the commercial steamer *Brookdale*, the vessel leaving Seattle August 21. The annual supplies for the bureau's vessel *Eider* were shipped at the same time and were delivered at Unalaska.

Unloading was accomplished speedily and the vessel left the Pribilofs September 24. It is estimated that the cargo consisted of approximately 2,500 tons.

Early in the year the bureau contracted with the Alaska Commercial Co. for delivery from the States to the Pribilof Islands of approximately 325 tons of salt, 600,000 feet of lumber, 310,000 shingles, 5,200 sacks of cement, 5 tons of bricks, and 20 tons of miscellaneous supplies. The salt was transported from San Francisco to the Pribilofs by the *Apollo*. The balance of the materials was shipped from Seattle on the steamship *Brookdale* to the Unalaska station of the Alaska Commercial Co., whence it was taken to the Pribilofs by the *Apollo*.

Other miscellaneous supplies were transported from Seattle on Coast Guard cutters through the courtesy of the U. S. Coast Guard and landed either at the islands or at Unalaska for transportation to the islands by the *Eider*.

POWER SCHOONER "EIDER."

The *Eider* has rendered very useful service in connection with activities at the Pribilof Islands, and during the calendar year 1922 made 13 trips to the Pribilofs, 1 to King Cove, 1 to Umnak, 2 to Belkofsky, and 2 to Akutan. The total number of miles cruised was 8,749 in 96 days. The actual running time was 1,228½ hours. Two hundred and three passengers, 320 tons of freight besides mail, 14 cases of fox skins, 50 barrels of sealskins, and 12 live foxes were carried.

CONSTRUCTION WORK.

St. Paul Island.—Construction was continued on the new water-tank house, and the four 40,000-gallon water tanks were set up. The roofing laid in 1921 was damaged in a gale in the fall of that year, and as the building is in a very exposed place it was deemed best to lay shingles over the original roof rather than to attempt repairs.

The roadway from the village to Northeast Point has never been in condition to permit more than lightly loaded wagons to make the trip. The distance between the places is about 12 miles, about 4 of which are over sand dunes. In bringing to the village sealskins taken at Northeast Point it is necessary to transport them by boats on the open sea, a hazardous undertaking, practicable only when the weather conditions are favorable, and subject to frequent delays. In order that these sealskins may be washed and blubbered at the village, as is now being done with the skins taken elsewhere on the island, they must receive attention within a few hours after removal from the seals. Material to lay wooden tracks for automobile trucks and tractors over the worst stretches of sand was shipped to St. Paul in 1922, and the work of grading and laying out those portions of the roadway that could be made usable without tracks was begun in the spring of that year and pushed vigorously until sealing operations demanded all the energies of the working force. It was decided to abandon the old bridge, now in a state of collapse, across

FIG. 13.—Unalaska, nearest port to Pribilof Islands.

FIG. 14.—Drying seal meat for natives, Pribilof Islands.

the slough near Halfway Point and to carry the new road far enough inland to avoid the slough.

A building in which to wash and blubber sealskins was begun in 1921 and completed with two extensions in 1922. Work was continued on the new village salt house, which was used in its entirety in the sealing season, and on the addition to the old village salt house. The old salt house itself was torn down, and a more modern structure was begun on its site. There will thus be two large salt houses at the village. Work was begun on enlarging the "company" house, which is used as a mess house and living quarters for a part of the station employees.

A new boatway was begun at the warehouse at the village landing preparatory to replacing that warehouse with a building more suitable for the requirements. The work of building 20 privies for the use of the natives was carried to a point where all were available for use.

St. George Island.—A number of improvements were made to the landing facilities at the village on St. George Island. The solid rock floor of the slip was deepened about 18 inches for a distance of approximately 30 feet. A large amount of blasting was done to deepen the channel leading to the slip. Since the work was done under water it is difficult to determine accurately how much was accomplished, but it is known that boats can be operated at lower stages of the tide than formerly. About 1,000 pounds of 40 per cent dynamite were used. A concrete bulkhead was built across the inner end of the landing slip and provides valuable space for temporary storage of cargo and for the placing of boats. In December, 1921, the tramway leading from the wharf was destroyed by heavy seas. It was rebuilt in 1922, concrete replacing the previous frame and stone construction.

A dispensary and physician's quarters was built. The building has ground dimensions of 24 by 32 feet and provides an office, living room, bedroom, bath, and a large surgery on the lower floor and space for two small bedrooms on the upper floor. A building formerly used as a gun house was moved to a position adjoining the new dispensary, with which it will be connected by a vestibule and used as a hospital. A 20-foot addition was made to the schoolhouse.

The first concrete native dwelling was completed and occupied this year and a second building of this type was erected. Each of these contains a roomy vestibule, kitchen, living room, and three bedrooms on the first floor and space for two small bedrooms on the second floor. The work of installing a permanent water-supply system for the village was continued. The source of water will be Upper Lake.

WELL DRILLING.

The bureau cooperated in 1922, as in 1921, with the Navy Department in an effort to secure on St. Paul Island a supply of fresh water from a drilled well. Drilling was begun August 8 at a point between the radio-station buildings and the village cove and was continued until October 10. A depth of 415 feet was attained, but a supply of water was not located.

BY-PRODUCTS PLANT.

Early in the season the by-products plant was placed in readiness for active operations, and some improvements were made. The machinery was tested out the latter part of May, and oil remaining from 1921 was stored in barrels.

Actual operation of the plant was begun July 5 and continued every day until August 10, primarily for the production of oil from blubber to be used in preparing sealskins for the market. Fifteen cookings of seal blubber and two of seal carcasses were made, the latter for the purpose of securing required data.

In the season of 1922, 8,546 gallons of oil—consisting of 7,078 gallons blubber oil, 1,368 gallons press oil, and 100 gallons oil foots—and 1,935 pounds of seal meal were manufactured. The following shipments of fur-seal oil were made:

Shipments of fur-seal oil to Fouke Fur Co., 1922.

Kind of oil.	Year manufactured.	Date of shipment.	Vessel on which shipped.	Number of barrels.	Number of gallons.
Blubber	1921	July 31	U. S. S. Gold Star	11	493
Do	1922	...do...	...do...	19	905
Do	1921	Sept. 24	Steamship Brookdale	24	1,084
Press	1921	...do...	...do...	18	920
Blubber	1922	...do...	...do...	125	6,173
Press	1922	...do...	...do...	27	1,368
Total				224	10,943

NATIVES.

CENSUS.

An annual census is taken of the natives of the Pribilof Islands, including such details as are deemed of value for purposes of record. For several years the census has been taken as of March 31. This date has now been changed to December 31. The total number of natives actually residing on St. Paul Island on December 31, 1922, was 193, on St. George Island, 127, a total for both islands of 320.

Recapitulation of census of natives, Pribilof Islands, December 31, 1922.

St. Paul Island:		
Resident population on Mar. 31, 1921		188
Births, Apr. 1, 1921, to Dec. 31, 1922		9
		197
Deaths, Apr. 1, 1921, to Dec. 31, 1922		9
		188
Arrivals, Apr. 1, 1921, to Dec. 31, 1922		19
		207
Departures, Apr. 1, 1921, to Dec. 31, 1922		14
Resident population on Dec. 31, 1922		193
Other natives away from St. Paul Island but considered residents		11
Total natives accredited to St. Paul Island		204

Recapitulation of census of natives, Pribilof Islands—Continued.

St. George Island:	
Resident population on Mar. 31, 1921	122
Births, Apr. 1, 1921, to Dec. 31, 1922	11
	133
Deaths, Apr. 1, 1921, to Dec. 31, 1922	2
	131
Arrivals, Apr. 1, 1921, to Dec. 31, 1922	2
	133
Departures, Apr. 1, 1921, to Dec. 31, 1922	6
Resident population on Dec. 31, 1922	127
Other natives away from St. George Island but considered residents	6
Total natives accredited to St. George Island	133
Both islands:	
Total resident population on Dec. 31, 1922	320
Other natives away from islands but considered residents	17
Grand total natives accredited to Pribilof Islands	337

HEALTH CONDITIONS.

There were no features of special importance in respect to the health conditions of the natives. Numerous cases of impetigo occurred on St. Paul Island, and late in the summer and through the fall months there were many cases on St. George Island. There were no other epidemics and no serious accidents. Taking their race into consideration, the health of the Pribilof natives during 1922 may be considered to have been normal. A Unalaska native temporarily employed on St. Paul Island died there in the summer of 1922.

DENTAL WORK.

Dr. D. L. Roland, employed by the bureau as dentist for the natives, arrived at St. Paul Island August 4, 1921, and was continuously engaged in professional work there until May 13, 1922, when he left for St. George Island, arriving there May 14. He left the latter station for the States June 18. A large amount of the more necessary work was accomplished, but much remained to be done. It is hoped that in the future the bureau will be able to send a dentist to the islands for temporary duty on alternate years at least.

SCHOOLS.

St. Paul Island.—The school term of 1921–22 opened September 12 and closed about May 1. The senior school began with an enrollment of 13 boys and 13 girls. The pupils were divided into six classes, and individual instruction was given as far as possible. The course of instruction was similar to that of previous years. Particular emphasis was placed on the use of English. Attention was given to the subject of personal hygiene, and the dentist temporarily at the station through the winter gave weekly instruction in the care of the teeth and inaugurated tooth-brush drills. At the junior school 30 pupils were in attendance, their ages ranging from 5 to 10 years.

Special emphasis was placed on conversations in English, simple arithmetic, and writing. For the youngest pupils modified kindergarten methods were followed. Fair progress was reported for both schools.

St. George Island.—The senior school opened September 6, 1921, and closed April 10, 1922, having been in session 122½ days. The enrollment consisted of 16 boys and 22 girls, a total of 38. The average daily attendance was 37.5 and percentage of attendance about 99. The subjects taught were reading, arithmetic, spelling, writing, history, and geography. The junior school opened September 6, 1921, and closed May 15, 1922. The session opened with an enrollment of 6; 2 were dropped subsequently on account of their youth, and 1 was added from the senior school. Kindergarten methods were followed. A sewing class attended by 22 girls, divided into three classes, was conducted by the teacher of the junior school.

ATTENDANCE AT SALEM INDIAN TRAINING SCHOOL, CHEMAWA, OREG.

All the Pribilof Islands natives who were reported employed at the Salem Indian Training School or in attendance there on December 31, 1921, including Mrs. Akalina Fratis, Iuliania Fratis, Nicolai Stepetin, and Vasilii Stepetin, of St. Paul Island, and George Lekanof and Laurence Merculief, of St. George Island, left during 1922. Mrs. Akalina Fratis and Iuliania Fratis were at Marshfield, Oreg., according to last reports. Nicolai Stepetin returned to his home on St. Paul Island. George Lekanof, who it has developed was dropped from the school in 1921, returned to his home on St. George Island. Laurence Merculief left the school but did not return to his home. Vasilii Stepetin returned to St. Paul Island, where he was given employment as a temporary laborer. Inasmuch as his father has permanently given up his residence on the Pribilofs it is probable that he will not regard the islands as his home in the future. The only person to enter the school from the Pribilofs in 1922 was Serge Shaisnikoff, a 16-year-old boy of St. Paul Island, who entered the school on November 7.

SAVINGS ACCOUNTS.

Certain of the Pribilof Island natives have personal funds in the custody of the United States Commissioner of Fisheries. Through the year 1922 these funds were kept on deposit with the Washington Loan and Trust Co., Washington, D. C., and interest was paid at the rate of 3 per cent per annum, calculated on monthly balances. New accounts for two natives were opened during the year. A summary of the accounts as a whole for the year 1922 is shown in the statement that follows:

Balance on hand, Jan. 1, 1922	$2,726.23
Interest earned from Jan. 1 to Dec. 31, 1922	303.23
Deposited by natives in 1922	8,910.48
	11,939.94
Withdrawn by natives in 1922	106.00
Balance on hand, Dec. 31, 1922	11,833.94

An itemized statement of the account showing the individual balances of the natives follows:

Pribilof Islands natives' savings accounts in custody of U. S. Commissioner of Fisheries, as trustee, December 31, 1922.

St. Paul Island:	
Bourdukofsky, Appollon [1]	$95.92
Bourdukofsky, Peter	.90
Fratis, Agrippina [2]	98.57
Fratis, Akalina [2]	477.58
Fratis, Martha [2]	98.55
Fratis, Iuliania [2]	98.55
Gromoff, Iuliania	370.21
Kochutin, Alexandra [2]	4,516.02
Krukoff, Ekaterina	209.98
Krukoff, Iuleta	9.43
Mandregan, Alexandra M	10.83
Melovidov, Alfey	45.73
Melovidov, Anton	3.89
Melovidov, Iosef	45.73
Merculieff, Agafia	40.99
Merculieff, Dosofey	40.99
Merculieff, Makary	40.99
Merculieff, Mariamna	68.31
St. Paul Island—Continued.	
Merculieff, Paul A. [1]	$16.07
Pankoff, Agrippina	250.10
Pankoff, Maria M	45.74
Sedick, Feofania [1]	14.26
Sedick, Lavrenty	14.26
Sedick, Leonty	14.26
Sedick, Marina	.38
Tetoff, Vikenty M	45.73
St. George Island:	
Borenien, Zoya [1]	250.47
Galanin, Mary	35.53
Lestenkof, Michael	138.67
Merculief, Agrippina	19.40
Merculief, Joseph	35.78
Merculief, Polyxenia	19.70
Merculief, Stefanida [3]	4,618.52
Shane, Michael	41.45
Zacharof, Emanuel	.45
Total	11,833.94

PAYMENTS FOR TAKING SEALSKINS.

Continuing the practice of preceding years payments to certain persons engaged in the taking of sealskins in 1922 were made from funds advanced by the department's selling agents, the Fouke Fur Co., who were reimbursed subsequently from proceeds of sales of skins. The funds were deposited in a bank in Seattle and made payable to the order of the bureau's authorized and bonded agent at the Pribilofs. From these funds the natives of the Pribilofs were paid at the rate of 50 cents for each sealskin taken, four native foremen were given $200 for additional services, and the salaries of a number of sealing assistants and the wages of some natives from Unalaska and elsewhere temporarily employed at the islands were paid, the amounts earned by these persons being as follows:

Salaries of sealing assistants	$13,364.15
Wages of temporary native workmen	19,729.80
Amount earned by St. Paul natives	13,117.50
Amount earned by St. George natives	2,660.50
Total	48,871.95

St. Paul Island.—For the 26,035 sealskins taken on St. Paul Island in the calender year 1922 the resident natives received 50 cents per skin and in addition two foremen received $50 each for special

[1] Deceased.
[2] Not living on island in 1922.
[3] New account.

services. The natives were divided into classes according to their ability and work, and payments were made as follows:

Payments to St. Paul natives for sealing operations, calendar year 1922.

Classification.	Number of men.	Share of each.	Total.	Classification.	Number of men.	Share of each.	Total.
First class	27	$343.50	$9,274.50	Special class	1	$25.00	$25.00
Second class	5	274.00	1,370.00	Two foremen (additional compensation)			100.00
Third class	5	222.50	1,112.50				
Fourth class	3	171.50	514.50				
Fifth class	4	137.50	550.00	Total	47		13,117.50
Sixth class	2	85.50	171.00				

St. George Island.—For the 5,121 skins taken on St. George Island in the calendar year 1922 the resident natives received 50 cents per skin, and in addition two foremen received an aggregate of $100 for special services. As on St. Paul Island payments were made in accordance with rated ability and work.

Payments to St. George natives for sealing operations, calendar year 1922.

Classification.	Number of men.	Share of each.	Total.	Classification.	Number of men.	Share of each.	Total.
First class	18	$93.00	$1,674.00	Boy's class	1	$10.00	$10.00
Second class	4	75.00	300.00	Two foremen (additional compensation)			100.00
Third class	6	65.00	390.00				
Fourth class	3	55.00	165.00				
Fifth class	1	21.50	21.50	Total	33		2,660.50

PAYMENTS FOR TAKING FOX SKINS.

The natives of the Pribilof Islands are paid $5 for each fox skin taken. The take in the trapping season of 1921-22 was 159 on St. Paul Island and 574 on St. George Island, a total of 733, which accordingly yielded the St. Paul natives $795 and the St. George natives $2,870, a total of $3,665. On St. Paul Island the foxes are caught in steel traps, set at various places. Each native who participates in the trapping looks after a definite number of traps and receives $5 for each skin that he secures. On St. George Island no steel traps are used, and since almost all the fox skins taken are secured from foxes that enter the corral at the village trapping-house the work is necessarily a joint operation on the part of those participating. Consequently, the total payment for skins taken on St. George Island is divided among the workmen in accordance with what is considered the proper share of each. The funds for making the payments are advanced by the Fouke Fur Co., which recovers the outlay from the proceeds of sales of skins.

FUR-SEAL HERD.

QUOTA FOR KILLING.

On May 25, 1922, the Assistant Secretary of Commerce approved the bureau's recommendation that the quota of seals to be killed in the calendar year 1922 should be 25,000 three-year-old males. Of this number 21,500 were assigned as the St. Paul Island quota and

3,500 as the St. George Island quota. It was provided that the inter-island quota might be modified and that an increase or change in the aggregate total might be made if circumstances during the progress of the season should indicate such changes desirable.

On July 17 the Assistant Secretary of Commerce, who was then at the islands, increased the year's quota to 30,000 three-year-old males. This change was made after personal observation of conditions and after taking into account the increasing number of seals appearing on the hauling grounds. It was felt that the action in question was entirely compatible with the future welfare of the herd. For determination of the comparative market values of skins from 2-year-old and 3-year-old seals the Assistant Secretary also directed the killing of 200 two-year-old males, as far as practicable the larger animals of this class—that is to say, seals whose lengths are from 39 to 40¾ inches.

KILLINGS OF SEALS.

The total number of seals killed on both islands in 1922 was 31,156, of which 30,002 were 3-year-old males. The other 1,154 consisted in part of the 200 large 2-year-olds taken by direction of the Assistant Secretary and the balance almost altogether of 2 and 4 year-old males taken incidentally with the killing of the 3-year-olds. The 3-year-old class of males varies only 5 inches in length from the smallest to the largest, and as the length of the seal has to be judged by the eye before it is killed it is impossible to avoid killing a few that measure slightly under or over the desired size. Details regarding the killings are shown in the table below.

St. Paul Island.—In the calendar year 97 drives were made and 26,035 skins, including 1 from a seal found dead and 4 from seals killed at odd times, were secured.

St. George Island.—In the calendar year 33 drives were made and 5,121 skins, including 1 from a seal found dead and 2 from seals killed for fox food, were secured.

Seal killings on Pribilof Islands in 1922.

ST. PAUL ISLAND.

Date.	Serial No. of drive.	Hauling ground.	Skins secured.	Date.	Serial No. of drive.	Hauling ground.	Skins secured.
Feb. 4	1	Sea Lion Rock (Sivutch)	31	June 26	16	Vostochni (vicinities of rocks 64 and 70)	312
Apr. 28	.....	....do	1	June 27	17	Tolstoi	171
May 22	2	....do	75	Do	18	Gorbatch and Reef	483
May 27	.....	Vostochni	2	June 28	19	Zapadni	202
May 29	3	Sea Lion Rock	100	June 29	20	Vostochni (vicinities of rocks 43, 49, and 53) and Morjovi (vicinity of rock 40)	433
June 9	.....	Vostochni	1	Do	21	Little Polovina	46
June 15	4	Sea Lion Rock (Sivutch)	124	Do	22	Polovina	282
June 20	5	Polovina and Polovina Cliffs	70	June 30	23	Tolstoi	157
Do	6	Vostochni (vicinities of rocks 49 and 53)	304	Do	24	Lukanin	48
June 21	7	Lukanin	17	July 1	25	Vostochni (vicinities of rocks 64 and 70)	583
Do	8	Tolstoi	143	July 2	26	Reef	1,700
Do	9	Vostochni (vicinities of rocks 64 and 70)	185	July 3	27	Vostochni (vicinities of rocks 49 and 53) and Morjovi (vicinity of rock 40)	160
June 22	10	Gorbatch	105	Do	28	Little Zapadni	64
Do	11	Reef	16	Do	29	Zapadni	221
June 23	12	Zapadni	81	July 5	30	Lukanin	63
June 24	13	Tolstoi	72	Do	31	Tolstoi	307
Do	14	Lukanin	95				
Do	15	Vostochni (vicinities of rocks 49 and 53) and Morjovi (vicinity of rock 40)	269				

Seal killings on Pribilof Islands in 1922—Continued.

ST. PAUL ISLAND—Continued.

Date.	Serial No. of drive.	Hauling ground.	Skins secured.
July 6	32	Vostochni (vicinities of rocks 64 and 70)	554
Do	33	Little Polovina	16
Do	34	Polovina	541
July 7	35	Reef and Gorbatch	893
July 8	36	Vostochni (vicinities of rocks 49 and 53) and Morjovi (vicinity of rock 40)	251
Do	37	Little Zapadni	13
Do	38	Zapadni	241
Do	39	Tolstoi	249
Do	40	Lukanin	24
July 10	41	Little Polovina	44
Do	42	Polovina	289
July 11	43	Vostochni (vicinity of rock 64)	692
Do	44	Gorbatch	372
Do	45	Reef	558
July 12	.....	From seal found dead on Gorbatch	1
July 13	46	Vostochni (vicinity of rock 49) and Morjovi (vicinity of rock 36)	555
Do	47	Tolstoi	230
Do	48	Lukanin	138
July 14	49	Polovina, Little Polovina and Polovina Cliffs	141
July 15	50	Vostochni (vicinities of rocks 64 and 70)	506
Do	51	Gorbatch	512
Do	52	Reef	477
July 16	53	Zapadni	227
July 18	54	Reef	313
Do	55	Gorbatch	163
Do	56	Vostochni (vicinities of rocks 43, 49, 53) and Morjovi (vicinity of rock 36)	225
Do	57	Lukanin	122
Do	58	Tolstoi	230
July 20	59	Vostochni (vicinities of rocks 64 and 70)	587
Do	60	Polovina Cliffs	50
Do	61	Polovina and Little Polovina	205
July 21	62	Reef	142
Do	63	Gorbatch	412
July 22	64	Vostochni (vicinities of rocks 43, 49, 53) and Morjovi (vicinity of rock 36)	335
Do	65	Zapadni and Little Zapadni	497
July 23	66	Tolstoi	229
July 23	67	Lukanin and Kitovi	423
July 24	68	Polovina and Polovina Cliffs	320
Do	69	Vostochni (vicinities of rocks 64 and 70)	463
July 25	70	Vostochni (vicinities of rocks 43, 49, 53) and Morjovi (vicinity of rock 36)	170
Do	71	Gorbatch	631
Do	72	Reef	435
July 26	73	Zapadni and Little Zapadni	222
July 27	74	Vostochni (vicinities of rocks 64 and 70)	440
Do	75	Tolstoi	242
Do	76	Lukanin	82
July 28	77	Vostochni (vicinities of rocks 43, 49, 53) and Morjovi (vicinity of rock 36)	127
Do	78	Polovina Cliffs	19
Do	79	Polovina and Little Polovina	149
July 29	80	Gorbatch	471
Do	81	Reef	230
July 30	82	Vostochni (vicinities of rocks 64 and 70)	244
Do	83	Zapadni and Little Zapadni	406
July 31	84	Vostochni (vicinities of rocks 43, 49, 53) and Morjovi (vicinity of rock 36)	239
Aug. 1	85	Tolstoi	103
Do	86	Lukanin	22
Aug. 2	87	Vostochni (vicinities of rocks 64 and 70)	357
Do	88	Reef and Gorbatch	544
Aug. 3	89	Vostochni (vicinity of rock 49) and Morjovi (vicinity of rock 36)	137
Do	90	Zapadni	382
Aug. 4	91	Lukanin	59
Do	92	Tolstoi	38
Aug. 5	93	Vostochni (vicinities of rocks 49, 53, 64, 70) and Morjovi (vicinity of rock 36)	170
Do	94	Reef and Gorbatch	329
Oct. 21	95	Gorbatch	201
Oct. 26	96	Reef	215
Nov. 1	97	Vostochni	208
		Total	26,035

ST. GEORGE ISLAND.

June 8	1	North, Staraya Artil and East Cliffs	28
June 13	2	North and Staraya Artil	21
June 16	3	Staraya Artil	14
June 17	4	North	17
June 20	5	East Cliffs	42
June 21	6	Zapadni	8
June 23	7	North and Staraya Artil	73
June 26	8	East Cliffs	81
June 28	9	North and Staraya Artil	86
June 29	10	Zapadni	28
June 30	11	East Cliffs	103
July 3	12	North and Staraya Artil	118
July 5	.....	From seal found dead	1
July 6	13	East Cliffs	294
July 7	14	Zapadni	63
July 8	15	North and Staraya Artil	132
July 10	16	East Cliffs	135
July 12	17	North and Staraya Artil	284
July 13	18	Zapadni	35
July 15	19	East Cliffs	596
July 17	20	Staraya Artil	144
July 19	21	North and East Cliffs	606
July 20	22	Zapadni	40
July 22	23	North, East Cliffs, and Staraya Artil	586
July 26	24	North	185
July 27	25	Zapadni	50
July 28	26	Staraya Artil	217
July 29	27	North, East Reef, and East Cliffs	303
Aug. 2	28	North, Staraya Artil, and East Reef	498
Aug. 5	29	East Reef	61
Sept. 11	.....	.....	[1] 2
Oct. 20	30	North	18
Oct. 21	31	East Cliffs and East Reef	119
Oct. 26	32	North and Staraya Artil	130
Nov. 9	33	Zapadni	3
		Total	5,121

[1] Seals killed for food for foxes awaiting shipment.

AGE CLASSES OF SEALS.

The method by which the sizes of male seals of the various age classes have been determined has been described in previous reports. For convenience the limits of these age classes are shown in the following table:

Age standards of body lengths of male seals, Pribilof Islands.

Age.	Lengths of summer seals.	Lengths of fall seals.	Age.	Lengths of summer seals.	Lengths of fall seals.
	Inches.	*Inches.*		*Inches.*	*Inches.*
Yearlings	Up to 36.75	Up to 38.75	4-year-olds	46 to 51.75	48 to 53.75
2-year-olds	37 to 40.75	39 to 42.75	5-year-olds	52 to 57.75	54 to 59.75
3-year-olds	41 to 45.75	43 to 47.75	6-year-olds	58 to 63.75	60 to 65.75

Ages of seals killed on Pribilof Islands, calendar year 1922.

Age.	Summer (Jan. 1 to Aug. 5).			Fall (Aug. 6 to Dec. 31)			Total for year.		
	St. Paul.	St. George.	Total.	St. Paul.	St. George.	Total.	St. Paul.	St. George.	Both Islands.
Yearlings	8		8				8		8
2-year-olds	510	26	536	17	13	30	527	39	566
3-year-olds	24,398	4,755	29,153	602	247	849	25,000	5,002	30,002
4-year-olds	416	45	461		10	10	416	55	471
5-year-olds	8	1	9				8	1	9
6-year-olds	4		4				4		4
7-year-olds and over		2	2		1	1		3	3
Cows [1]	67	20	87	5	1	6	72	21	93
Total	25,411	4,849	30,260	624	272	896	26,035	5,121	31,156

[1] The few cows reported above, less than one-third of 1 per cent of the total taken, were accidentally and unavoidably killed. Every possible effort is made to avoid the killing of cows, but persons familiar with conditions at the islands will readily appreciate that in handling such a large number of seals a small number of cows will be killed.

BRANDED SEALS.

Only one of the seals branded when pups in 1912 was secured in 1922. The animal was taken on St. George Island at North rookery, October 20, 1922. Data were secured as follows: Length, 76¾ inches; total weight after bleeding, 283 pounds; dimensions of green skin, 80 by 51 inches; weight of skin, 41 pounds.

WASHING AND BLUBBERING SEALSKINS.

In 1922 the Fouke Fur Co. carried on its work of washing and blubbering sealskins on St. Paul Island on a more extended scale than in previous years. A permanent building, 70 by 42 feet, constructed for this work, was used. It is known as the washhouse and contains five large wooden tanks, in which the skins to be blubbered are first washed and cooled in salt water pumped from the beach near by, facilities for 10 men to work at blubbering, and a power wringer to extract surplus water from blubbered skins.

The freshly taken sealskins are brought to the washhouse, where they are placed in the tanks and quickly chilled by running sea water to below 40° F. All dirt and other foreign matter are removed by

the free use of a pressure hose. The blubber is removed from the pelts by dull, curved knives, the operation being called blubbering. The skins are then run through a large wringer to extract surplus water and are then packed in salt for curing.

The blubbering of the skins before they are salted makes it possible to skin the seals in a more expeditious manner. Formerly the skins had to be removed by cutting away every portion with a knife. They could not be pulled off without leaving too much blubber on the pelts to permit their being cured in salt. When the pelts are blubbered before they are salted, however, the amount of blubber adhering to the skins at the time of removal from the animals is immaterial. Skins that are to be blubbered before salting are now removed by pulling them off the carcasses after a few cuts have been made along the lines that become the edges of the pelt, thus eliminating the former more or less frequent and practically unavoidable cutting of pelts. Another advantage claimed for the blubbering of skins before salting is that the time required for curing is greatly reduced, thus insuring complete curing before any decay starts.

In 1922 there were washed on St. Paul Island 15,752 skins. Of these 15,748 were blubbered and 4 were placed in salt without blubbering for experimental purposes. The washing and blubbering of sealskins was not undertaken on St. George Island in 1922. It was thought best to develop the work thoroughly on St. Paul Island first.

CENSUS.

The census of the Pribilof fur-seal herd was again taken by Edward C. Johnston in 1922. His report is printed in full on pages 111 to 118. The two counting towers used on Reef rookery in 1921 and nine more erected in the spring of 1922—two on Little Zapadni (St. Paul), three on Zapadni (St. Paul), three on Vostochni (St. Paul), and one on Staraya Artil (St. George)—were used. For the first time in a number of years the pups were counted on all the rookeries. Conditions made it impossible to enumerate every pup, but at least 95 per cent of all were actually counted.

The following is a comparative statement of the numerical strength of the various elements of the herd in the years 1912 to 1922, inclusive:

General comparison of recent censuses of the seal herd on Pribilof Islands.

Classes.	1912	1913	1914	1915	1916
Harem bulls	1,358	1,403	1,559	2,151	3,500
Breeding cows	81,984	92,269	93,250	103,527	116,977
Idle bulls	113	105	172	673	2,632
Young bulls (chiefly 5-year-olds)	199	259	1,658		
6-year-old males					11,167
5-year-old males				11,271	15,494
4-year-old males	100	2,000	9,939	15,848	15,427
3-year-old males	2,000	10,000	13,880	18,282	19,402
2-year-old males	11,000	15,000	17,422	23,990	24,169
Yearling males	13,000	20,000	23,068	30,307	33,645
2-year-old cows	11,000	15,000	17,422	23,990	24,245
Yearling cows	13,000	20,000	23,067	30,306	33,646
Pups	81,984	92,269	93,250	103,527	116,977
Total	215,738	268,305	294,687	363,872	417,281

FIG. 15.—Delivering sealskins at washhouse, St. Paul Island.

FIG. 16.—Blubbering sealskins, St. Paul Island.

General comparison of recent censuses of the seal herd, etc.—Continued.

Classes.	1917	1918	1919	1920	1921	1922
Harem bulls	4,850	5,344	5,158	4,066	3,909	3,562
Breeding cows	128,024	142,915	157,172	167,527	176,655	185,914
Surplus bulls	8,977	17,110	9,619	6,115	3,301	2,346
Idle bulls	2,706	2,444	2,239	1,161	747	508
6-year-old males	15,397	13,755	8,991	4,153	3,991	3,771
5-year-old males	14,813	11,941	5,282	5,007	4,729	6,080
4-year-old males	16,631	7,114	5,747	5,667	6,780	11,807
3-year-old males	19,507	9,117	13,596	10,749	14,668	7,459
2-year-old males	26,815	30,159	33,081	39,111	41,893	40,920
Yearling males	38,013	41,595	46,444	51,074	50,249	52,988
2-year-old cows	26,917	30,415	33,287	39,480	43,419	46,280
Yearling cows	38,018	41,608	46,447	51,081	54,447	57,413
Pups	128,024	142,915	157,172	167,527	176,655	185,914
Total	468,692	496,432	524,235	552,718	581,443	604,962

CHARTING OF HAREM AREAS.

In connection with the census the harem areas were platted on the Coast and Geodetic Survey charts of the rookeries. This was done at the time the harem counts were made, which was at the height of the breeding season. A comparison of the extent of these areas with that of the corresponding areas platted in 1916 shows no great change in size. It is not the total number of seals on the breeding grounds that determines the area occupied but the positions taken up by the harem bulls at the beginning of the breeding season. The number of harem bulls 1922 was practically the same as in 1916, and it is entirely consistent that the breeding areas should be about the same in the two years regardless of the fact that the number of breeding cows increased from 116,977 in 1916 to 185,914 in 1922. The increased number of cows simply increased the number of breeding animals per unit of breeding area.

PHOTOGRAPHS OF SEAL ROOKERIES.

The stations used in taking photographs in 1917 were reoccupied and a comparable set of views was obtained. Unfavorable landing conditions made necessary the omission of Sea Lion Rock (Sivutch rookery) from the series in 1922. Although satisfactory views as a whole were obtained, the maximum results were not possible because of rain and fog just at the time when the photographs had to be taken if the views were to be comparable with previous ones.

To serve as an index to the location and direction from which these photographs were taken these data were platted on photographic reductions of the rookery charts. No chart is available for South Rookery on St. George, as it has originated since the series of charts was made.

It is expected that from the counting towers already erected for the census work and from additional ones to be erected a comprehensive series of panoramic views of the herd may be secured, which will better serve the purpose of photographic records of these rookeries.

SPECIMEN SEALS.

In 1922 from among seals found dead 16 were selected and preserved as specimens, including 2 bulls, 2 five-year-old males, 2 three-

year-old males, 2 two-year-old males, 2 yearling males, 2 black pups, 2 gray pups, and 2 three-year-old females. The specimens were sold to the Fouke Fur Co., St. Louis, for $56.

FOXES.

FOX-TRAPPING SEASON OF 1922–23.

The season's take of fox pelts on both islands consisted of 888 blue and 29 white pelts, a total of 917.

On St. Paul Island trapping began December 18 and ended December 30, 1922. Forty-four native men engaged in the work, and 532 traps were used. In all 233 pelts were secured, of which 205 were blue and 28 white.

On St. George Island trapping began in December, 1922, and continued until March 8, 1923. Trapping to secure pelts ceased, however, on February 18 when signs of mating were observed, trapping thereafter being solely for the purpose of securing additional data in regard to the breeding reserves. Including 2 blue-fox pelts secured in November, 1922, from animals found dead, the take of pelts for the season consisted of 683 blue and 1 white, a total of 684 pelts. The total number of foxes marked and released as breeders was 304, of which 147 were males and 157 females. The actual breeding reserve was considerably more than 304, since many animals did not enter the traps at all.

Trapping on St. George Island was again very much handicapped by the prevailing warm and wet weather. Foxes will enter the trapping corral at the village only under the urge of hunger. Snow and ice cut off the natural sources of food to a large extent, and under those conditions the foxes enter the corral much more readily than when open weather makes available considerable food at other places on the island.

SALE OF BLUE FOXES.

To assist private enterprise in blue-fox farming the bureau sold 12 live animals from the Pribilof herds in 1922. They were secured on St. George Island and delivered at Unalaska by the fisheries vessel *Eider* in September. The price was $175 per animal, which was somewhat above the current market for pelts. The animals were sold to the following persons: John Mattick, Seward, Alaska, 4 pairs; H. Whittlesey, Seward, Alaska, 1 pair; and Charles Williamson, Unalaska, Alaska, 2 females. From the $2,100 received in payment $60 ($5 per fox) was divided among the St. George natives employed in capturing and shipping the animals. The balance, $2,040, was available for the United States Treasury.

REINDEER.

The reindeer herds on St. Paul and St. George Islands are a valuable source of fresh meat for both the bureau's personnel and the natives. The herds are being drawn upon for food purposes to an increasing extent, but the number remaining at the end of each year, with the exception, for reasons unknown, of St. Paul Island in 1922, has increased. The forage is ample to support herds much larger than those existing at present. The animals run at large and are

very wild, the native men of the islands not having much aptitude for handling them. In 1922 on St. Paul Island 38 reindeer were killed for food and on St. George Island 22, a total of 60.

Reindeer herd on the Pribilof Islands, 1911–1922.

Year.	St. Paul Island.				St. George Island.				Grand total.	
	Adults.	Fawns.	Total, end of year.	Killed in year.	Adults.	Fawns.	Total, end of year.	Killed in year.	End of year.	Killed in year.
1911	[1] 25	.....	25	.....	[2] 15	.....	15	.....	40	.....
1912	[3] 23	17	40	.....	[2] 14	11	25	.....	65	.....
1913	[4] 34	18	52	.....	[5] 25	13	38	.....	90	.....
1914	[6] 51	24	75	.....	[7] 37	21	58	.....	133	.....
1915	65	27	92	.....	44	18	62	.....	154	.....
1916	.....	.....	111	.....	54	31	85	2	196	2
1917	105	39	144	.....	70	26	96	3	240	3
1918	120	40	160	2	.....	.....	114	18	274	20
1919	.....	.....	164	14	.....	.....	123	22	287	36
1920	.....	.....	192	22	.....	.....	125	31	317	53
1921	.....	.....	250	34	.....	.....	160	19	410	53
1922	.....	.....	190	38	.....	.....	200	22	390	60

[1] 21 females. [2] 12 females. [3] 20 females. [4] 25 females. [5] 21 females. [6] 36 females. [7] 26 females.

PRIBILOF FUR-SEAL SKINS.

SHIPMENTS AND SALES.

In the calendar year 1922 three shipments of sealskins, consisting of 31,381 commercial skins, and 16 specimen skins, were made from the Pribilof Islands. On July 31 there were placed aboard the U. S. S. *Gold Star* at St. Paul Island 48 barrels, containing 2,358 sealskins, of which 718 were of the 1921 take and 1,640 of the 1922. They arrived at Seattle August 11 and were at once forwarded by freight to the Fouke Fur Co., St. Louis, arriving there September 9.

On August 12 there were placed aboard the fisheries vessel *Eider* at St. Paul Island 50 barrels, containing 2,601 sealskins, which were taken to Akutan and placed aboard the steamship *Cordova.* This vessel left Akutan August 22, and the skins were received at St. Louis September 19.

A third shipment, made on the steamship *Brookdale*, consisted of 334 barrels containing 21,170 commercial sealskins and 2 barrels containing specimen sealskins from St. Paul Island, and 103 barrels containing 5,252 skins from St. George Island. The St. George shipment consisted of 403 skins taken in 1921 and the 4,849 taken in 1922 through August 5. The *Brookdale* left the Pribilofs September 24 and landed the skins at Seattle October 26. They were immediately forwarded by freight to the Fouke Fur Co., arriving at St. Louis November 9.

Two sales of fur-seal skins from the Pribilof Islands—some dressed, dyed, and machined, and others that had not been passed through the full process of dressing, dyeing, and machining—were held in St. Louis, Mo., during the calendar year 1922. In all 30,172 skins were sold at auction for $924,343.05. The table below gives the details regarding the prices secured for each lot of skins at each of

the sales, and the table on page 99 is a summary showing the prices obtained for the skins in the various trade classes and the percentages that the number of skins in these several classes bore to the totals in each sale.

April 3, 1922.—At the sale on this date 12,198 dressed, dyed, and machined Pribilof skins were sold for $388,069.75, an average price per skin of $31.81, a decrease of 3.6 per cent as compared with corresponding skins sold at the last previous sale September 28, 1921. There were also sold 579 culls and rejects, consisting of 249 dressed and dyed, 117 dressed, 121 washed and dried, and 92 raw skins, which brought $218.25.

October 9, 1922.—At the sale on this date 17,194 dressed, dyed, and machined Pribilof skins were sold for $535,967.50, an average price per skin of $31.17, a decrease of 2 per cent as compared with corresponding skins sold at the last previous sale April 3, 1922. There were also sold 164 raw, washed, and dried skins and 37 raw salted skins, which brought $87.55.

Sales of Pribilof fur-seal skins at St. Louis, Mo., 1922.

SALE OF 12,198 DRESSED, DYED, AND MACHINED SKINS, APRIL 3, 1922.

Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.	Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
1	50	Wigs	$46.00	$2,300.00	46	90	Medium	$37.00	$3,330.00
2	40	do	47.00	1,880.00	47	90	do	36.00	3,240.00
3	50	Wigs; cut, scarred, etc	29.00	1,450.00	48	90	do	36.50	3,285.00
					49	90	do	36.50	3,285.00
4	50	do	29.50	1,475.00	50	90	do	38.00	3,420.00
5	60	Extra extra large	63.00	3,780.00	51	90	do	37.00	3,330.00
6	60	do	63.00	3,780.00	52	90	do	38.00	3,420.00
7	50	Extra extra large; cut, scarred, etc	42.50	2,125.00	53	90	do	37.00	3,330.00
					54	90	do	37.00	3,330.00
8	70	Extra large	52.00	3,640.00	55	90	do	36.00	3,240.00
9	70	do	54.00	3,780.00	56	90	do	38.50	3,465.00
10	70	do	55.50	3,885.00	57	90	do	39.00	3,510.00
11	70	do	55.00	3,850.00	58	90	do	37.50	3,375.00
12	70	do	55.00	3,850.00	59	90	do	37.50	3,375.00
13	70	do	59.00	4,130.00	60	90	do	37.00	3,330.00
14	70	do	60.00	4,200.00	61	90	do	37.00	3,330.00
15	70	do	60.00	4,200.00	62	90	do	37.50	3,375.00
16	70	Extra large; cut, scarred, etc	43.00	3,010.00	63	90	do	37.00	3,330.00
					64	90	do	38.00	3,420.00
17	70	do	43.00	3,010.00	65	90	do	37.00	3,330.00
18	70	do	44.00	3,080.00	66	90	do	37.00	3,330.00
19	80	Large	50.00	4,000.00	67	90	do	36.00	3,240.00
20	80	do	50.00	4,000.00	68	90	do	37.50	3,375.00
21	80	do	51.50	4,120.00	69	90	do	37.00	3,330.00
22	80	do	47.00	3,760.00	70	90	Medium; cut, scarred, etc	30.00	2,700.00
23	80	do	49.00	3,920.00					
24	80	do	50.00	4,000.00	71	90	do	26.00	2,340.00
25	80	do	50.50	4,040.00	72	90	do	26.00	2,340.00
26	80	do	50.50	4,040.00	73	90	do	26.50	2,385.00
27	80	do	50.00	4,000.00	74	90	do	26.00	2,340.00
28	80	do	54.00	4,320.00	75	90	do	26.00	2,340.00
29	80	do	53.00	4,240.00	76	90	do	26.00	2,340.00
30	80	do	51.00	4,080.00	77	90	do	26.00	2,340.00
31	80	do	55.00	4,400.00	78	90	do	26.50	2,385.00
32	80	Large; cut, scarred, etc	39.00	3,120.00	79	90	do	26.00	2,340.00
					80	90	do	26.50	2,385.00
33	80	do	41.00	3,280.00	81	90	do	26.50	2,385.00
34	80	do	41.50	3,320.00	82	90	do	26.50	2,385.00
35	90	Medium	41.00	3,690.00	83	90	do	26.00	2,340.00
36	90	do	39.50	3,555.00	84	90	do	26.50	2,385.00
37	90	do	37.50	3,375.00	85	90	do	26.50	2,385.00
38	90	do	37.50	3,375.00	86	90	do	26.50	2,385.00
39	90	do	36.00	3,240.00	87	90	do	26.50	2,385.00
40	90	do	36.50	3,285.00	88	90	Small medium	28.50	2,565.00
41	90	do	36.50	3,285.00	89	90	do	27.50	2,475.00
42	90	do	37.50	3,375.00	90	90	do	28.50	2,565.00
43	90	do	36.50	3,285.00	91	90	do	28.50	2,565.00
44	90	do	37.00	3,330.00	92	90	do	28.50	2,565.00
45	90	do	38.00	3,420.00	93	90	do	28.50	2,565.00

Sales of Pribilof fur-seal skins at St. Louis, Mo., 1922—Continued.

SALE OF 12,198 DRESSED, DYED, AND MACHINED SKINS, APRIL 3, 1922—Contd.

Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.	Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
94	90	Small medium	$28.50	$2,565.00	139	37	Large; cut, scarred, etc.	$37.50	$1,387.50
95	90	do	29.00	2,610.00					
96	70	do	28.00	1,960.00	140	80	Medium	35.00	2,800.00
97	90	Small medium; cut, scarred, etc	23.50	2,115.00	141	80	Medium; cut, scarred, etc	26.50	2,120.00
98	90	do	22.50	2,025.00	142	37	22 medium, 15 small medium	26.50	980.50
99	90	do	22.50	2,025.00					
100	90	do	22.50	2,025.00	143	28	16 medium; cut, scarred, etc., 12 small medium; cut, scarred, etc	21.00	588.00
101	90	do	22.00	1,980.00					
102	90	do	22.50	2,025.00					
103	90	do	23.00	2,070.00					
104	90	do	22.50	2,025.00	144	50	III Wigs	6.50	325.00
105	90	do	22.50	2,025.00	145	50	do	6.00	300.00
106	90	do	22.00	1,980.00	146	50	do	5.50	275.00
107	90	do	22.00	1,980.00	147	50	do	5.50	275.00
108	50	III Wigs	10.50	525.00	148	50	do	5.50	275.00
109	50	do	10.00	500.00	149	50	do	5.50	275.00
110	30	do	10.00	300.00	150	50	do	5.50	275.00
111	50	III, 31 extra large, 19 large	15.50	775.00	151	50	do	6.00	300.00
					152	50	do	6.00	300.00
112	80	III, 37 medium, 43 small medium	11.00	880.00	153	50	do	6.50	325.00
					154	50	do	6.00	300.00
113	20	IV Wigs	5.00	100.00	155	50	do	6.50	325.00
114	50	Wigs	60.00	3,000.00	156	50	do	6.50	325.00
115	50	do	58.00	2,900.00	157	50	do	6.50	325.00
116	50	do	58.00	2,900.00	158	50	do	7.00	350.00
117	58	do	53.00	3,074.00	159	42	do	6.50	273.00
118	50	Wigs; cut, scarred, etc	29.50	1,475.00	160	55	III, 14 extra extra large, 4 extra large, 7 large, 5 medium, 25 small medium	13.50	742.50
119	50	do	28.50	1,425.00					
120	50	do	28.50	1,425.00					
121	50	do	29.00	1,450.00					
122	50	do	28.00	1,400.00	161	50	IV Wigs	1.50	75.00
123	50	do	28.00	1,400.00	162	50	do	2.00	100.00
124	50	do	28.50	1,425.00	163	50	do	2.00	100.00
125	50	do	29.00	1,450.00	164	50	do	1.50	75.00
126	50	do	30.00	1,500.00	165	50	do	2.25	112.50
127	50	do	29.00	1,450.00	166	50	do	3.00	150.00
128	50	do	29.50	1,475.00	167	50	do	2.25	112.50
129	22	do	31.50	693.00	168	50	do	2.25	112.50
130	33	Extra extra large	62.00	2,046.00	169	50	do	1.50	75.00
131	50	Extra extra large; cut, scarred, etc	44.00	2,200.00	170	50	do	1.50	75.00
					171	50	do	1.75	87.50
132	27	do	43.50	1,174.50	172	50	do	1.50	75.00
133	44	Extra large	57.00	2,508.00	173	50	do	1.75	87.50
134	50	Extra large; cut, scarred etc	41.00	2,050.00	174	40	IV, 28 wigs, 8 extra extra large, 2 extra large, 2 large	1.50	60.00
135	23	do	40.00	920.00					
136	50	Large	48.00	2,400.00	175	27	Skins, damaged	8.25	222.75
137	25	do	53.50	1,337.50					
138	50	Large; cut, scarred, etc	35.00	1,750.00		12,198			388,069.75

SALE OF 579 MISCELLANEOUS SKINS, APRIL 3, 1922.

176	72	Dressed and dyed	$0.50	$36.00	179	121	Washed and dried	$0.25	$30.25
177	177	do	.50	88.50	180	92	Raw	.054	5.00
178	117	Dressed	.50	58.50					
						579			218.25

SALE OF 17,194 DRESSED, DYED, AND MACHINED SKINS, OCTOBER 9, 1922.

1	50	Wigs	$51.00	$2,550.00	12	70	Extra large	$59.00	$4,130.00
2	50	do	51.00	2,550.00	13	70	do	56.00	3,920.00
3	50	Wigs; cut, scarred, etc	32.00	1,600.00	14	70	do	56.00	3,920.00
					15	70	do	56.00	3,920.00
4	50	do	32.50	1,625.00	16	70	do	59.50	4,165.00
5	39	do	34.50	1,345.50	17	70	do	60.00	4,200.00
6	60	Extra extra large	59.00	3,540.00	18	44	do	61.00	2,684.00
7	60	do	60.00	3,600.00	19	44	do	59.00	2,596.00
8	68	do	62.00	4,216.00	20	70	Extra large; cut, scarred, etc	39.00	2,730.00
9	60	Extra extra large; cut, scarred, etc	39.00	2,340.00	21	70	do	37.00	2,590.00
10	50	do	41.00	2,050.00	22	70	do	36.00	2,520.00
11	22	do	43.00	946.00	23	70	do	40.00	2,800.00

Sales of Pribilof fur-seal skins at St. Louis, Mo., 1922—Continued.

SALE OF 17,194 DRESSED, DYED, AND MACHINED SKINS, OCTOBER 9, 1922—Contd.

Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
24	70	Extra large; cut, scarred, etc	$39.00	$2,730.00
25	62	....do	38.00	2,356.00
26	80	Large	48.00	3,840.00
27	80	....do	47.00	3,760.00
28	80	....do	48.00	3,840.00
29	80	....do	48.50	3,880.00
30	80	....do	50.50	4,040.00
31	80	....do	47.00	3,760.00
32	80	....do	46.00	3,680.00
33	80	....do	50.00	4,000.00
34	80	....do	48.50	3,880.00
35	80	....do	46.00	3,680.00
36	80	....do	48.00	3,840.00
37	80	....do	47.00	3,760.00
38	80	....do	46.00	3,680.00
39	80	....do	48.00	3,840.00
40	80	....do	49.50	3,960.00
41	80	....do	45.00	3,600.00
42	80	....do	48.00	3,840.00
43	80	....do	45.50	3,640.00
44	80	....do	46.50	3,720.00
45	80	....do	46.00	3,680.00
46	80	....do	45.00	3,600.00
47	80	....do	47.00	3,760.00
48	80	....do	46.00	3,680.00
49	80	....do	47.00	3,760.00
50	80	....do	47.50	3,800.00
51	80	....do	49.00	3,920.00
52	80	....do	48.00	3,840.00
53	80	....do	46.00	3,680.00
54	80	....do	48.50	3,880.00
55	80	....do	47.50	3,800.00
56	80	....do	46.00	3,680.00
57	80	....do	47.50	3,800.00
58	80	....do	57.00	4,560.00
59	73	....do	48.00	3,504.00
60	80	Large; cut	36.00	2,880.00
61	80	....do	36.50	2,920.00
62	80	....do	35.00	2,800.00
63	80	....do	34.00	2,720.00
64	80	....do	34.00	2,720.00
65	80	....do	32.50	2,600.00
66	80	....do	33.00	2,640.00
67	80	....do	32.50	2,600.00
68	80	....do	32.00	2,560.00
69	80	....do	33.50	2,680.00
70	80	....do	33.00	2,640.00
71	80	....ho	32.50	2,600.00
72	80	....do	32.50	2,600.00
73	80	....do	32.50	2,600.00
74	80	....do	32.50	2,600.00
75	80	....do	33.00	2,640.00
76	80	....do	34.50	2,760.00
77	80	....do	33.00	2,640.00
78	80	....do	35.00	2,800.00
79	80	....do	34.50	2,760.00
80	80	....do	33.50	2,680.00
81	80	....do	33.00	2,640.00
82	80	....do	33.00	2,640.00
83	48	....do	32.50	1,560.00
84	47	....do	34.50	1,621.50
85	90	Medium	35.00	3,150.00
86	90	....do	34.50	3,105.00
87	90	....do	36.00	3,240.00
88	90	....do	34.00	3,060.00
89	90	....do	35.00	3,150.00
90	90	....do	34.00	3,060.00
91	90	....do	33.50	3,015.00
92	90	....do	34.00	3,060.00
93	90	....do	33.50	3,015.00
94	90	....do	33.00	2,970.00
95	90	....do	32.50	2,925.00
96	90	....do	34.00	3,060.00
97	90	....do	32.50	2,925.00
98	90	....do	34.00	3,060.00
99	90	....do	34.00	3,060.00
100	90	Medium	$34.50	$3,105.00
101	90	....do	33.00	2,970.00
102	90	....do	33.00	2,970.00
103	90	....do	33.50	3,015.00
104	90	....do	33.00	2,970.00
105	90	....do	32.50	2,925.00
106	90	....do	32.00	2,880.00
107	90	....do	32.50	2,925.00
108	90	....do	31.50	2,835.00
109	90	....do	31.50	2,835.00
110	90	....do	30.50	2,745.00
111	90	....do	30.50	2,745.00
112	90	....do	30.50	2,745.00
113	90	....do	30.50	2,745.00
114	90	....do	30.50	2,745.00
115	90	....do	35.00	3,150.00
116	90	....do	32.50	2,925.00
117	90	....do	31.50	2,835.00
118	90	....do	31.50	2,835.00
119	90	....do	30.50	2,745.00
120	90	....do	31.50	2,835.00
121	90	....do	31.00	2,790.00
122	90	....do	30.50	2,745.00
123	90	....do	30.50	2,745.00
124	90	....do	30.00	2,700.00
125	90	....do	31.00	2,790.00
126	90	....do	31.50	2,835.00
127	90	....do	30.00	2,700.00
128	90	....do	41.50	3,735.00
129	50	....do	33.50	1,675.00
130	50	....do	33.50	1,675.00
131	90	Medium; cut, scarred, etc	20.00	1,800.00
132	90	....do	21.00	1,890.00
133	90	....do	21.00	1,890.00
134	90	....do	21.50	1,935.00
135	90	....do	20.50	1,845.00
136	90	....do	20.50	1,845.00
137	90	....do	20.50	1,845.00
138	90	....do	19.00	1,710.00
139	90	....do	22.00	1,980.00
140	90	....do	20.00	1,800.00
141	90	....do	20.00	1,800.00
142	90	....do	21.50	1,935.00
143	90	....do	21.00	1,890.00
144	90	....do	21.50	1,935.00
145	90	....do	21.00	1,890.00
146	90	....do	19.50	1,755.00
147	90	....do	22.00	1,980.00
148	90	....do	20.00	1,800.00
149	90	....do	19.50	1,755.00
150	90	....do	19.50	1,755.00
151	90	....do	19.50	1,755.00
152	90	....do	19.50	1,755.00
153	90	....do	21.50	1,935.00
154	90	....do	20.00	1,800.00
155	90	....do	21.50	1,935.00
156	90	....do	19.50	1,755.00
157	90	....do	20.50	1,845.00
158	90	....do	19.00	1,710.00
159	90	....do	19.50	1,755.00
160	90	....do	20.00	1,800.00
161	90	....do	21.00	1,890.00
162	90	....do	20.00	1,800.00
163	90	....do	20.00	1,800.00
164	90	....do	20.00	1,800.00
165	90	....do	20.00	1,800.00
166	90	....do	20.00	1,800.00
167	90	....do	20.50	1,845.00
168	90	....do	20.50	1,845.00
169	90	....do	20.50	1,845.00
170	90	....do	21.00	1,890.00
171	90	....do	21.00	1,890.00
172	90	....do	21.50	1,935.00
173	90	....do	20.50	1,845.00
174	90	....do	20.25	1,822.50
175	90	....do	20.50	1,845.00
176	53	....do	21.00	1,113.00

Sales of Pribilof fur-seal skins at St. Louis, Mo., 1922—Continued.

SALE OF 17,194 DRESSED, DYED, AND MACHINED SKINS, OCTOBER 9, 1922 Contd.

Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.	Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
177	90	Small medium	$21.00	$1,890.00	199	90	Small medium; cut, scarred, etc	$17.00	$1,530.00
178	90	do	21.00	1,890.00					
179	90	do	23.50	2,115.00	200	90	do	15.50	1,395.00
180	90	do	24.00	2,160.00	201	90	do	17.00	1,530.00
181	90	do	25.00	2,250.00	202	90	do	16.50	1,485.00
182	90	do	24.50	2,205.00	203	90	do	16.50	1,485.00
183	90	do	25.00	2,250.00	204	53	do	16.25	861.25
184	90	do	26.00	2,340.00	205	53	do	16.75	887.75
185	90	do	27.50	2,475.00	206	50	III wigs	10.50	525.00
186	90	do	27.00	2,430.00	207	39	do	14.50	565.50
187	41	do	27.00	1,107.00	208	52	III, 16 extra extra large, 36 extra large	16.50	858.00
188	90	Small medium; cut, scarred, etc	16.00	1,440.00	209	63	III large	12.50	787.50
189	90	do	15.00	1,350.00	210	60	III medium	13.00	780.00
190	90	do	16.00	1,440.00	211	57	do	11.50	655.50
191	90	do	17.25	1,552.50	212	63	III small medium	8.50	535.50
192	90	do	17.50	1,575.00	213	33	IV, 22 wigs, 1 extra extra large, 2 extra large, 5 large, 1 medium, 2 small medium	7.50	247.50
193	90	do	16.50	1,485.00					
194	90	do	16.00	1,440.00					
195	90	do	17.75	1,597.50					
196	90	do	16.50	1,485.00					
197	90	do	17.00	1,530.00					
198	90	do	17.25	1,552.50		17,194			535,967.50

SALE OF 201 MISCELLANEOUS SKINS, OCTOBER 9, 1922.

Lot No.	Number of skins.	Description.	Price per skin.	Total for lot.	Lot No.	Number of skins.	Description.	Price per skin.	Total for lot.
215	164	Raw; washed and dried	$0.50	$82.00	216	37	Raw; salted	$0.15	$5.55
						201			87.55

Comparative values by sizes and grades, with percentages each size, of Pribilof sealskins sold in 1922.

Classes and sales.	Grade.	Number.	High.	Low.	Average.	Total.	Total number.	Average.	Total price.	Percentage.
Wigs:										
Apr. 3	I and II	298	$60.00	$46.00	$53.81	$16,054.00	2,590	$16.63	$43,074.50	20.27
	Cut, etc	672	31.50	28.00	29.01	19,493.00				
	III	922	10.50	6.50	6.67	6,148.00				
	IV	698	5.00	1.50	1.98	1,379.50				
Oct. 9	I and II	100	51.00	51.00	51.00	5,100.00	350	31.22	10,926.00	2.01
	Cut, etc	139	34.50	32.00	32.88	4,570.50				
	III	89	14.50	10.50	12.25	1,090.50				
	IV	22	7.50	7.50	7.50	165.00				
Extra extra large:										
Apr. 3	I and II	153	63.00	62.00	62.78	9,606.00	302	50.68	15,306.50	2.36
	Cut, etc	127	44.00	42.50	43.30	5,499.50				
	III	14	13.50	13.50	13.50	189.00				
	IV	8	1.50	1.50	1.50	12.00				
Oct. 9	I and II	188	62.00	59.00	60.40	11,356.00	337	50.34	16,963.50	1.94
	Cut, etc	132	43.00	39.00	40.42	5,336.00				
	III	16	16.50	16.50	16.50	264.00				
	IV	1	7.50	7.50	7.50	7.50				
Extra large:										
Apr. 3	I and II	604	60.00	52.00	56.36	34,043.00	924	50.49	46,650.50	7.23
	Cut, etc	283	44.00	40.00	42.65	12,070.00				
	III	35	15.50	13.50	15.27	534.50				
	IV	2	1.50	1.50	1.50	3.00				
Oct. 9	I and II	508	61.00	56.00	58.14	29,535.00	958	47.88	45,870.00	5.51
	Cut, etc	412	40.00	36.00	38.17	15,726.00				
	III	36	16.50	16.50	16.50	594.00				
	IV	2	7.50	7.50	7.50	15.00				

Comparative values by sizes and grades, with percentages each size, of Pribilof sealskins sold in 1922—Continued.

Classes and sales.	Grade.	Number.	High.	Low.	Average.	Total.	Total number.	Average.	Total price.	Percentage.
Large:										
Apr. 3...	I and II	1,115	$55.00	$47.00	$50.81	$56,657.50	1,470	$47.56	$69,907.00	11.51
	Cut, etc	327	41.50	35.00	39.32	12,857.50				
	III	26	15.50	13.50	14.95	389.00				
	IV	2	1.50	1.50	1.50	3.00				
Oct. 9...	I and II	2,713	57.00	45.00	47.62	129,184.00	4,716	41.33	194,910.50	27.11
	Cut	1,935	36.50	32.00	33.54	64,901.50				
	III	63	12.50	12.50	12.50	787.50				
	IV	5	7.50	7.50	7.50	37.50				
Medium:										
Apr. 3...	I and II	3,252	41.00	26.50	37.18	120,923.00	5,010	33.28	166,738.50	39.21
	Cut, etc	1,716	30.00	21.00	26.42	45,341.00				
	III	42	13.50	11.00	11.30	474.50				
Oct. 9...	I and II	4,060	41.50	30.00	32.69	132,725.00	8,281	26.33	218,013.50	47.61
	Cut, etc	4,103	22.00	19.00	20.44	83,845.50				
	III	117	13.00	11.50	12.27	1,435.50				
	IV	1	7.50	7.50	7.50	7.50				
Small medium:										
Apr. 3...	I and II	805	29.00	26.50	28.36	22,832.50	1,875	24.62	46,170.00	14.68
	Cut, etc	1,002	23.50	21.00	22.48	22,527.00				
	III	68	13.50	11.00	11.92	810.50				
Oct. 9...	I and II	941	27.50	21.00	24.56	23,112.00	2,552	19.31	49,284.00	14.67
	Cut, etc	1,546	17.75	15.00	16.57	25,621.50				
	III	63	8.50	8.50	8.50	535.50				
	IV	2	7.50	7.50	7.50	15.00				
Skins damaged:										
Apr. 3...		27	8.25	8.25	8.25	222.75	27	8.25	222.75	.21
	Description.									
Culls and rejects:										
Apr. 3...	Dressed and dyed	249	.50	.50	.50	124.50	579	.38	218.25	4.53
	Dressed	117	.50	.50	.50	58.50				
	Washed and dried	121	.25	.25	.25	30.25				
	Raw	92	.054	.054	.054	5.00				
Oct. 9...	Raw, washed and dried	164	.50	.50	.50	82.00	201	44	87.55	1.15
	Raw, salted	37	.15	.15	.15	5.55				
All classes:										
Apr. 3...							12,777	30.39	388,288.00	100.00
Oct. 9...							17,395	30.82	536,055.05	100.00

DISPOSITION OF SEALSKINS.

The grand total of all fur-seal skins on hand at the Pribilof Islands and at St. Louis on January 1, 1921, was 53,878. In 1922 a total of 31,156 skins was secured and 30,172 were sold, leaving a balance on hand on December 31, 1922, of 54,862. The following two tables show the skins on hand both at the beginning and end of 1922 at the Pribilofs and at St. Louis, the numbers taken and shipped from the Pribilofs, and the numbers received and sold at St. Louis.

Summary of all fur-seal skins handled on Pribilof Islands, calendar year 1922.

	Balance on hand Jan. 1.	Number taken.	Total handled.	Number shipped.	Balance on hand Dec. 31.
St. Paul Island	[1] 718	26,035	26,753	26,129	624
St. George Island	403	5,121	5,524	5,252	272
Total	1,121	31,156	32,277	31,381	896

[1] The preceding report for 1921 gave the number on hand as 717, but when the skins were packed for shipment in 1922 one more skin was found, thereby increasing the number to 718.

Summary of receipts and sales of Pribilof fur-seal skins by Fouke Fur Co., St. Louis, Mo., and balance in firm's custody, calendar year 1922.

Date of shipment from Pribilofs.	Receipts.		Sales.		Balance on hand.
	Date.	Number of skins.	Date.	Number of skins.	
	Jan. 1				52,757
			Apr. 3	12,777	39,980
July 31	Sept. 9	2,358			42,338
Aug. 12	Sept. 19	2,601			44,939
Sept. 24	Nov. 9	26,422			71,361
			Oct. 9	17,395	[1] 53,966
Total		31,381		30,172	

[1] Includes 7 at Washington.

PRIBILOF FOX SKINS.

SHIPMENTS AND SALES.

The fox skins, 138 blues and 21 whites, taken on St. Paul Island in the season of 1921–22 were shipped on the U. S. S. *Gold Star* July 31, 1922, and reached Seattle August 11. The skins were then forwarded by express to the Fouke Fur Co., St. Louis. The fox skins, 574 blues, taken on St. George Island in the season of 1921–22, were transferred by the fisheries schooner *Eider* in August to the steamship *Cordova* at Akutan for transportation to the States. The skins were consigned to the Fouke Fur Co. and were received at St. Louis on September 19. All were sold there at public auction October 9, 1922. The total amount bid for the 712 blue fox skins was $66,344, the maximum bid being $165 each for a lot of four and the average bid $93.18 per skin. The 21 white fox skins brought $966, an average of $46 per skin. The average price at the last preceding sale, September 28, 1921, was $96.83 for blue and $33 for white fox skins.

Sale of 712 blue and 21 white fox skins at St. Louis, October 9, 1922.

Lot number.	Number of skins.	Trade classification.	Price per skin.	Total for lot.	Lot number.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
		Blue fox skins.					*Blue fox skins*—Con.		
220	4	Extra extra fine	$165.00	$660.00	263	12	II blue	$82.00	$984.00
221	4	Extra fine, extra large	135.00	540.00	264	10	I dark	96.00	960.00
222	6	Fine dark	136.00	816.00	265	12	II dark	80.00	960.00
223	6	I fine dark silvery	136.00	816.00	266	8	I blue	100.00	800.00
224	10	I silvery	134.00	1,340.00	267	12	Blue	86.00	1,032.00
225	10	I blue	98.00	980.00	268	12	II low	45.00	540.00
226	10	I dark	102.00	1,020.00	269	11	Skins	38.00	418.00
227	8	do	120.00	960.00	270	4	Extra extra fine	164.00	656.00
228	6	II dark	84.00	504.00	271	4	Extra extra fine, extra large	122.00	488.00
229	10	I and II blue	96.00	960.00	272	4	Extra fine	145.00	580.00
230	4	Extra extra fine	162.00	648.00	273	4	Extra fine, extra large	114.00	456.00
231	4	Extra fine, extra large	124.00	496.00	274	6	Fine, extra large	114.00	684.00
232	6	Fine dark	130.00	780.00	275	8	I dark	96.00	768.00
233	6	Dark silvery	141.00	846.00	276	14	II dark	97.00	1,358.00
234	10	Dark	116.00	1,160.00	277	10	I blue	100.00	1,000.00
235	5	Fine dark silvery	137.00	685.00	278	12	II blue	80.00	960.00
236	10	I, pt. II, dark	105.00	1,050.00	279	10	do	80.00	800.00
237	5	Dark	128.00	640.00	280	16	II low blue	58.00	928.00
238	14	I, pt. II, blue	110.00	1,540.00	281	14	I dark	111.00	1,554.00
239	4	Extra extra fine	145.00	580.00	282	12	II dark	79.00	948.00
240	4	Extra extra fine, extra large	130.00	520.00	283	14	I and II	65.00	910.00
241	4	Extra fine	127.00	508.00	284	4	Extra extra fine	146.00	584.00
242	8	I fine dark	115.00	920.00	285	4	Extra fine	120.00	480.00
243	6	Extra dark	112.00	672.00	286	10	I dark	114.00	1,140.00
244	8	I dark	108.00	864.00	287	16	II dark	89.00	1,424.00
245	10	II dark	77.00	770.00	288	10	I blue	103.00	1,030.00
246	10	I blue	95.00	950.00	289	12	Blue	86.00	1,032.00
247	12	II blue	78.00	936.00	290	8	Silvery	116.00	928.00
248	12	II low blue	62.00	744.00	291	4	do	80.00	320.00
249	8	II	67.00	536.00	292	8	I and II dark	90.00	720.00
250	20	III	30.00	600.00	293	14	II dark	80.00	1,120.00
251	9	Skins	7.00	63.00	294	8	II extra large	74.00	592.00
252	10	I dark	100.00	1,000.00	295	6	I silvery	106.00	636.00
253	12	II dark	88.00	1,056.00	296	12	II dark	80.00	960.00
254	8	I blue	100.00	800.00	297	16	Dark	70.00	1,120.00
255	8	II blue	76.00	608.00	298	8	I silvery	104.00	832.00
256	12	II low blue	67.00	804.00	299	10	I and II	88.00	880.00
257	4	Extra extra fine	145.00	580.00		712			66,344.00
258	6	Extra fine	129.00	774.00			*White fox skins.*		
259	8	I fine dark	125.00	1,000.00					
260	10	I and II dark	110.00	1,100.00	339	21	I and II, white fox	46.00	966.00
261	12	II dark	78.00	936.00					
262	10	I blue	100.00	1,000.00		733			67,310.00

FUR-SEAL PATROL BY UNITED STATES COAST GUARD.

An active patrol for the protection of fur seals was maintained by the Coast Guard in 1922. The cutters engaged were the *Haida*, *Algonquin*, *Mojave*, *Snohomish*, *Unalga*, and *Bear*. The *Haida* and *Algonquin* patrolled both in the North Pacific Ocean and Bering Sea. The *Algonquin* also made a trip to Asiatic waters frequented by fur seals. The *Mojave* was used chiefly in transporting an official party headed by the Assistant Secretary of Commerce. The *Snohomish* patrolled the waters between the Columbia River and Dixon Entrance, southeast Alaska. The *Unalga* paid particular attention to southeast Alaska between Dixon Entrance and Yakutat Bay. The *Bear* made its usual cruise northward to the Arctic Ocean. The bureau is under many obligations to the Coast Guard for assistance furnished incidentally to the patrol work in the transportation of passengers, mail, and freight to and from the Pribilof Islands.

The following extracts are taken from information furnished by the Coast Guard in regard to the season's work. In connection with the patrol the cutters perform a great many duties of a public nature aside from those concerned with fur seals and the fisheries. The extracts have been selected only as they relate to fur-seal matters and occasionally to the fisheries industry.

Bear.—Preparatory to proceeding on her annual Alaskan cruise, the Coast Guard cutter *Bear* left Oakland, Calif., May 2, 1922. * * *. Having received on board mail and certain supplies, the vessel sailed from Seattle at 7 p. m. May 16, stopping at Port Townsend and in the Straits of Juan de Fuca, and arrived at Unalaska at 7.40 p. m. May 27. Throughout the voyage from Seattle a close observation was kept for fur seals, but none was sighted. * * *. En route from Nome to Unalaska the *Bear* stopped at St. Paul Island on September 18. * * *. Having completed her duties in Alaskan waters, the vessel sailed from Unalaska October 5 and arrived at Seattle, Wash., October 17.

Haida.—On April 15, 1922, at 10 a. m., the *Haida* left Seattle, Wash., on her Alaskan cruise. On board the cutter were 13 persons from the Bureau of Fisheries desiring passage to the Pribilof Islands and a native student for passage to Unalaska. Stores for the radio station at St. Paul Island and for the Attu schoolhouse were packed on board. All holds and storerooms were filled from the keel to the lower deck. The trip from Seattle to Unalaska was made in less than seven days, the cutter arriving at Unalaska at 8.30 p. m. April 21. * * *. Having received on board mail for points to be visited and several passengers, the *Haida* cast off from the dock at Unalaska at 8.30 a. m. April 24, proceeded to St. Paul Island, anchoring in Village Cove at 5.45 a. m. April 25. Landing at Village Cove being unfavorable, the cutter got under way, stood around Reef Point, and at 9.35 a. m. anchored in Lukanin Bay, St. Paul Island, where mail, 13 passengers, and freight were landed. After receiving on board mail for St. George Island and Unalaska at 4.15 p. m. April 25, got under way and at 7.15 anchored off St. George Island, where freight for the Bureau of Fisheries, mail, passengers, and baggage were landed. After receiving on board mail for St. Paul and Unalaska got under way at 8.40 p. m. April 25, and at 8 a. m. April 27 anchored off Sarichef Lighthouse. During the trip encountered thick mist, heavy snowfall, and rough sea. There being no assistance needed at this point, got under way and arrived at Unalaska at 4.30 p. m. * * *.

On May 3, at 7 a. m., got under way and continued patrolling. At 2.05 p. m. anchored in Ugamak Bay, under the lee of Ugamak Island on account of heavy weather. No vessels passed through nor were any vessels sighted. A large herd of sea lions, about 400 in number, was observed on Round Island. * * *.

On May 27, at 4.35 p. m., cast off from dock at Dutch Harbor and stood over for Unalaska, making fast to the dock at 5.55 p. m. Having taken on board mail and stores and 24 passengers, got under way at 9.15 a. m. June 1 for St. George and St. Paul and came to anchor off St. George village at 9.30 a. m. June 2. Delivered the mail for this point and took on mail for other points and at 9.50 a. m. got under way for St. Paul Island. Stood various courses around Reef Point into Village Cove, where anchored at 2.15 p. m. Delivered mail and stores and landed passengers. On June 3, at 11 a. m., stood out of Village Cove to take up the patrol within a radius of 100 miles around the Pribilof Islands. On June 7, at 12.40 a. m., anchored off St. George Island, and at 7.50 a. m. stood for St. George Village. Took on board six passengers for transportation to St. Paul Island and mail for that point and Unalaska. At 8.55 a. m. stood for St. Paul Island, anchoring off Village Cove at 12.30 p. m., where the six passengers left the vessel. Patrol of the islands was continued from June 7 until the 15th, on which date stood in for St. George Island, anchoring off the village at 3 p. m. At 7.50 p. m. stood offshore and continued the patrol of the island. Boarded the schooner *Fox*, inspected the vessel, and sent message for master. On June 17, at 7.15 p. m., anchored in Village Cove, St. Paul Island. Received on board three persons for transportation to Akutan. After taking on board mail got under way at 8.30 a. m. June 18 for St. George Island; at 12.25 p. m. anchored off North Anchorage and took aboard mail and six persons for transportation to Akutan. At 1 p. m. got under way for Akutan and moored at the dock of the Akutan whaling station at 11.20 a. m. June 19; discharged passengers, delivered the mail, and at 2 p. m. cast off and proceeded

to Unalaska, arriving there at 7.25 p. m. While on this cruise sighted 23 fur seals, boarded two vessels, and afforded medical treatment to eight persons. * * *.

On June 20, 21, and 22 remained at Unalaska, cleaning boiler and performing various other duties. On June 23, 24, 26, and 27 executed certain other duties in connection with the command of the *Haida*. On June 28, at 8.50 a. m., having received on board mail for the fishing fleet in Bristol Bay and for other places, got under way and at 9.15 a. m. made fast to the dock of the Alaska Commercial Co. at Dutch Harbor. At 8.05 a. m. June 29 cast off from the dock and stood to eastward and along the north side of Unimak Island and at 9.10 p. m. anchored off Cape Lapin, Unimak Island. On June 30, at 4.35 a. m., stood various courses in the vicinity of Amak Island, then stood to the eastward along Unimak Island and the Alaskan Penisusula. At 5.35 p. m. anchored off Cape Lieskof, the dense fog making further cruising unsafe. On July 1, at 7.30 a. m. got under way and stood various courses to rendezvous with *Algonquin*. At 2.30 p. m. proceeded toward the cannery at Nelson's Lagoon. At 6.10 p. m. boarded the American schooner *Wawona*, of Anacortes. delivered mail to her, and received mail for the schooners *John A* and *Fanny Dutard*. At 7.45 p. m. boarded the Japanese schooner *Bering Maru*, of Tokyo. At 8.45 p. m. stood for Port Moller and anchored off that place at 10.20 p. m. On July 2, at 8.15 a. m., got under way and stood various courses into Port Moller and at 12.05 p. m. anchored off Entrance Point. The medical officer vaccinated 40 natives and gathered statistical information, and the dental surgeon gave treatment to 13 natives. On July 3, at 11.15 a. m., got under way and stood various courses. Boarded schooner *Fanny Dutard*, delivered mail, and gave medical and dental treatment to two members of her crew. At 6.20 p. m. boarded schooner *Charles R. Wilson*, of Seattle, afforded medical treatment to two men, delivered mail, and examined vessel. Took on board a sick seaman for transportation to Unalaska. At 8.50 p. m. anchored near schooner *John A*. boarded her, and delivered mail. Got under way and at 9.55 p. m., anchored off Cape Seniavin. On July 4, at 4.15 a. m., got under way and stood various courses to Port Heiden. Anchored off Christakof Island at 8.55 a. m. The medical officer vaccinated 30 natives and rendered aid to 2 others. Collected statistics at this point. On July 5 the medical officer went ashore and treated 12 more natives at Port Heiden. At 2.55 p. m. got under way and stood various courses to westward. On July 6 continued cruising and at 1.05 p. m., anchored in the lee of Operl Island on account of stress of weather.

On July 7, at 6.10 a. m., got under way and set course for Pribilof Islands. On July 8, at 9.15 a. m., anchored off the village, St. George Island. Received mail for Unalaska and delivered mail for this place. Vessel remained at anchor owing to inclement weather. On July 9, at 8.35 a. m., proceeded for St. Matthew Island. * * *. At 8.35 a. m. got under way and set course for point on the one hundred and seventieth meridian, 150 miles north of St. Paul Island, to take up the patrol. Continued the patrol above mentioned throughout July 15. Continued patrol on July 16 and sighted 21 seals during the day. On July 17 continued patrolling. Upon receipt of a message that a native was in a critical condition and needed medical assistance got under way at 10 a. m. and proceeded to St. Paul Island. At 6.35 p. m. anchored off the village, St. Paul Island, where medical officer went ashore to treat the above-mentioned native. Landed mail and took on mail for Unalaska. Sighted 36 seals. On July 18, at 3.15 p. m., got under way and stood to the westward to continue the patrol. Sighted 32 seals this day. On July 19 continued the patrol. On July 20 proceeded to westward of the Pribilof Islands. On July 21 stood for Unalaska. While on this cruise boarded five vessels, sighted 111 seals, and the medical officer rendered treatment to 14 persons and vaccinated 70. On July 22 delivered mail to postmaster at Unalaska.

Up to July 30 the *Haida* lay in harbor undergoing inspection by a board. On July 30 proceeded to Dutch Harbor and filled fresh-water tank. At 8 p. m. cast off, and on July 31, at 7.50 p. m., anchored in Delarof Harbor, Unga Island. On August 1 shifted to dock at the Pacific American Fisheries cannery in Baralof Bay. * * *. Proceeded to Anchorage Bay, Chignik Bay, and on the morning of August 5 proceeded to Lazy Bay, Alitak Bay, Kodiak Island, arriving there at 7.50 p. m., to investigate a report of illegal possession of sealskin. Boarded the vessel *Lina K*, which was anchored in Lazy Bay, but found no evidence. On August 6 a searching party proceeded to Aiktalik Village to make an investigation; meantime the commanding officer with party made search of the village

of Akhiok for evidence of poaching fur-bearing animals; also of stolen articles from Perryville; no evidence was obtained. * * *. On August 9, at 10 a. m., arrived at Unga and delivered prisoner to United States Commissioner. At 2 p. m. got under way for Unalaska and at 3.15 p. m. August 10 made fast to dock at Dutch Harbor. While on this cruise boarded four vessels, sighted three seals, and afforded medical aid to seven persons. On the morning of August 11 moved to the dock at Unalaska.

On August 12, at 1.50 p. m., cast off from the dock and proceeded to the eastward and patrolled the fishing banks. On August 13 remained at anchor from 1.34 p. m. to 3.05 p. m. in order to repair machinery. The Japanese fishing schooners *Okhotsk Maru* and *Bering Maru*, found at anchor off Port Moller, were boarded, but no evidence of illegal operations was found. On August 14, at 7.55 p. m., arrived at Naknek anchorage, notified all cannery superintendents of the vessel's arrival, and offered assistance. On August 15, upon request of the superintendent of the Red Salmon Canning Co., settled a dispute between five Mexican laborers and the cannery officials, with the result that the offending persons resumed their work. On August 16, at 8.30 a. m., got under way for Sarichef, fell in with the tender *Curlew*, of the Alaska Packers Association, and took off that vessel an insane man who, having attempted suicide, was in need of immediate medical attention. On August 18, at 6 a. m., anchored off Sarichef. It being deemed necessary to operate on the man taken aboard from the tender *Curlew*, the *Haida* got under way and anchored in Dutch Harbor at 5.39 p. m. August 18. While on this cruise boarded 30 vessels, sighted two seals, and rendered medical assistance to one person.

On August 19, at 4.25 p. m., having sent patient ashore, cast off from dock at Dutch Harbor and proceeded to Akutan Harbor; anchored off the native village at 4.40 p. m. Party went ashore and searched the entire village for sealskins, but found none. After completing search the *Haida* shifted to berth at dock of Akutan whaling station. Thoroughly searched whaling station, but found no sealskins. Questioned several prominent persons under testimony, but gained no information of value as to illegal sealing. * * *.

On August 29, at 11.30 a. m., left Attu, standing for vicinity of Pribilof Islands to take up patrol, and arrived in patrol limits on September 1. On September 2 patrolled around islands. On September 3 patrolled area about Pribilof Islands. Stood in, and at 1.40 p. m. anchored close to steamship *Brookdale*, off Tolstoi Point, St. George Island. At 3.15 p. m. got under way and resumed patrol. On September 4, 5, and 6 patrolled about islands. On September 7 set course for Unalaska, and at 7.20 p. m. September 8 secured to dock at Unalaska. While on this cruise sighted 90 seals.

The *Haida* remained in the vicinity of Unalaska until September 29. During this time repairs were being made to the vessel's machinery. Having received on board mail and supplies for St. George Island, cast off from dock at Dutch Harbor at 11.10 a. m. and stood out of harbor, but, owing to severe gale, accompanied by rough sea, was compelled to lay to. On September 30, at 4 a. m., the gale having abated, set course for St. George Island, and at 3 p. m. anchored off the village. On October 1 delivered mail and stores from Unalaska. At the request of the agent, Bureau of Fisheries, took on board nine passengers for transportation to St. Paul Island. Received on board mail for St. Paul Island. On October 2 remained at anchor, owing to unfavorable weather conditions. On October 3, at 8.30 a. m., the gale having ceased, got under way and stood for St. Paul Island, anchoring in Lukanin Bay at 12.50 p. m. Delivered mail and packages of hardware received from St. George Island. The nine passengers went ashore. Got under way at 2.15 p. m. and stood to the northward. * * *.

Received from the postmaster at Nome mail for Juneau, Seattle, and Tacoma. Got under way at 2 p. m. (October 26) and stood to the southward. Arrived at St. Paul Island, anchoring in Lukanin Bay at 2.35 p. m. October 28. On the morning of October 29 shifted anchorage to Village Cove. Received mail for Seattle and Unalaska. At the request of superintendent, St. Paul Island, took aboard three persons for transportation to Seattle. Also took on board two radio men for transportation to Seattle. Twenty-two others came on board for transportation to Unalaska and one for St. George Island. Received on board 67 packages of provisions from the Naval Radio Station, St. Paul Island, for transportation to the Navy Yard, Puget Sound, Wash. Got under way at 12.45 p. m. (October 29) and stood for St. George Island, anchoring in Garden Cove at 4 p. m. Having received on board mail for Unalaska and Seattle, got under way at 4.40 p. m. and moored to the dock at Dutch Harbor

at 8.35 a. m. October 30. Delivered mail to postmaster at Unalaska and took on board mail for Seattle. One passenger, a native student, came on board for transportation to Seattle. On October 31, at 5.35 a. m., cast off from the dock at Dutch Harbor, stood various courses out of the harbor and through Akutan Pass, then headed for the Strait of Juan de Fuca. Arrived at Port Townsend, Wash., at 1.06 p. m. November 5, 1922.

Algonquin.—On April 15, 1922, at 10.10 a. m., the *Algonquin*, in company with the *Haida*, left Seattle, Wash., on her Alaskan cruise. Proceeded up the coast of Vancouver Island, and on the morning of April 16 boarded 22 small vessels engaged in fishing off Barclay Sound, then continued up the coast at a distance of 30 miles off. * * *. Boarded three vessels off Forrester Island on April 27. * * *. Arrived at Unalaska on June 3 at 3 p. m. During this cruise sighted 24 seals. * * *.

During the period from July 4 to 9 the *Algonquin* remained at Unalaska cleaning boiler and making necessary repairs to the vessel's machinery. Received on board C. H. Huston, Assistant Secretary of Commerce, Ward T. Bower, of the Bureau of Fisheries, and four others to be transported to the Pribilof Islands in the interest of the Department of Commerce; also took on board six natives to be sent to St. George Island as laborers for the Bureau of Fisheries. After receiving on board stores and mail for the Pribilof Islands got under way at 6.05 p. m. July 10 and arrived at St. George at 11.50 a. m. July 11. The official party left the vessel to transact certain business. Landed mail, stores, and native workmen. Took on board five natives for transportation to St. Paul Island. Upon return of the official party got under way at 4.40 p. m. for St. Paul but owing to thick fog was forced to anchor at 8.15 p. m., near Halfway Point. Got under way at 4.45 a. m. July 12 and steamed for Village Cove, coming to anchor at 5.40 a. m. The official party left the ship at 7.30 a. m. All mail, stores, and passengers for this point were landed. Got under way at 1.15 p. m. and arrived at Dutch Harbor at 12.45 p. m. July 13. During the vessel's stay in port stores were obtained, fuel-oil and fresh-water tanks were filled, and passengers whose transportation was authorized were taken on board. At 10.05 a. m. July 14 got under way, but owing to heavy sea and threatening storm was forced to return to Dutch Harbor. Made a second start, however, at 2.55 p. m. July 15 but was again forced to return to Dutch Harbor, owing to unfavorable weather conditions. Remained in port until July 17, at which time sailed at 12.40 p. m. and made fairly good progress against the heavy sea. Arrived at Glinka, Copper Island, at 10.30 p. m. July 22. The official party visited Glinka Village in the forenoon of July 23. Only the native guards were found at this place. Got under way at 11.45 a. m. same day for Preobrajeniya, Copper Island, arriving at 2.15 p. m. A party was sent ashore to interview the superintendent. Finding the food and tobacco supply to be very limited, made up a purse among the officers, crew, and passengers, with which certain staples were purchased from the various messes for presentation to the natives. Necessary work having been completed left Preobrajeniya at 10.45 p. m. July 23 anchoring near North Rookery, Bering Island, at 9.35 a. m. July 24 to await better weather conditions. At 5.30 a. m. the following day proceeded to Nikolskoe, arriving there at 9.50 a. m. July 25. Landed several passengers. Made another donation of supplies at this point. Got under way at 12 noon July 25 and anchored in Chichagof Harbor, Attu, at 8.15 p. m. July 26. * * *.

From the evening of September 12 until the next date of sailing the *Algonquin* remained in port at Unalaska, her personnel prosecuting such duties as completing the annual inspection, serving on boards, transferring stores from storehouses to ship, making minor repairs to vessel, cleaning boiler, and fueling. Having received on board several passengers and mail for delivery at Seattle, the *Algonquin* got under way from Unalaska at 11 a. m. September 24 and proceeded, via Unalga Pass, for Seattle, where she arrived at 8 p. m. September 30, 1922.

Mojave.—While the *Mojave* was not assigned to duty as a unit of the regular patrol force, this cutter made an extended cruise within the limits of the scope of operations of the patrol vessels and performed certain duties similar to those devolving upon the vessels of the regular patrol. The *Mojave* sailed from Seattle, Wash., at 2.30 p. m. June 20, 1922, having on board Assistant Secretary of Commerce C. H. Huston and party, and proceeded, via the inside passage, to Juneau, Alaska. During the trip numerous stops were made in southeastern Alaska. From Juneau the *Mojave* proceeded to Unalaska, stopping at various places designated by Assistant Secretary Huston, and

arrived there at 3.30 p. m. July 10. The *Mojave* remained at Unalaska until July 16. Assistant Secretary Huston and party had gone aboard the *Algonquin* for a cruise to the Pribilof Islands. On July 16, at 6 a. m., the *Mojave* left Unalaska and proceeded to Dutch Harbor. After taking on board a supply of fuel oil sailed for the Pribilof Islands at 3.35 p. m. July 17. A stop was made at St. George Island, where mail was delivered. Then proceeded to St. Paul Island, where came to anchor at 12.15 p. m. July 19. All mail and supplies from Unalaska were delivered. Assistant Secretary Huston and party having returned on board, the *Mojave* got under way at 3.30 p. m. and stood for Nome. The *Mojave* visited such points in northern Siberia as were designated by Assistant Secretary Huston, after which she proceeded to the southward and eastward from Anadir, Siberia, and again entered the patrol zone at 1 a. m. July 31. Arrived at Dutch Harbor at 3 p. m. August 1. At 9 a. m. August 2, having filled tanks with fuel oil, the *Mojave* steamed out of Dutch Harbor on her return journey. While on this cruise the *Mojave* maintained a vigilant lookout for seals and seal poachers. A few fur seals were sighted, but no indications of illegal sealing were observed.

Unalga.—Pursuant to her orders, the *Unalga* left Juneau, Alaska, on April 12, 1922, and on April 15 commenced the patrol off Dixon Entrance for the protection of the seal herd and sea otter. Stood to the northward about 30 miles offshore, arriving at Sitka on April 16. On account of inclement weather remained in Sitka Sound until April 23. The first fur seals were sighted on April 19, while the *Unalga* was anchored in Symonds Bay. On this occasion 35 fur seals were seen close to the entrance of the bay. In this locality it was discovered that Sitka natives had established a sealing camp. On April 23, left Sitka and cruised to the northward, standing offshore during the day and anchoring at night. A considerable number of fur seals were sighted offshore and a few inshore. Seals also were observed in Salisbury Sound, Fortuna Strait, and at the entrance to Khaz Bay. No vessels were sighted offshore and only one in the harbors visited by the cutter. On April 26 the *Unalga* stood into Cross Sound and proceeded to Juneau for coal and provisions, arriving there on April 28. On May 3 left Juneau and on the 4th stood out of Cross Sound for a cruise to the westward. Anchored at Yakutat on the night of the 5th and proceeded to the westward on the morning of the 7th. On May 8 cruised in the vicinity of Middleton Island for the purpose of boarding fishing vessels. On the evening of May 8 stood to the eastward and arrived at Sitka on May 10. On May 12 investigated the conditions at the natives' sealing camp at Symonds Bay, Biorka Island. Ascertained on arrival that, owing to continuous inclement weather, the natives had only a few opportunities for sealing and, therefore, had taken only 34 skins. It was also learned that the natives who were sealing from a camp on a neighboring island had obtained approximately the same number of skins. An examination of certain sealskins at Biorka Island disclosed the fact that none of the seals had been shot. On the afternoon of May 12 proceeded to the northward from Sitka Sound, anchoring in Nakwasina Passage that night. On May 13 visited Kalinin Bay and Leo Anchorage. On May 14 visited Dixon Harbor for the purpose of boarding fishing vessels which frequent these harbors. During this cruise numerous fur seals were sighted along the 100-fathom curve to the eastward of Yakutat Bay. Very few seals were sighted west of Yakutat, however, and none was seen at a considerable distance offshore of the 100-fathom curve. Such fishermen as were questioned claimed to have seen numerous seals in April but very few in May. They were of the opinion, however, that the main body of the seal herd had passed to the westward of Prince William Sound early in May. On May 15 the *Unalga* proceeded to Cross Sound, arriving at Juneau on May 16. On May 20 the *Unalga* left Juneau, standing out of Cross Sound on the 21st, and cruised to the westward as far as Yakutat Bay. A few fur seals were seen near the 100-fathom curve off Cape Spencer and Cape Fairweather, but in much smaller numbers than seen on previous occasions. On May 23 proceeded to the southeastward. On May 24 sighted six sealing boats from the native camps in Sitka Sound, about 15 miles southwestward of Biorka Island. At that time weather conditions were such as to make sealing impossible. Sighted no seals. On May 24 arrived at Sitka. From observation and from the most reliable information obtainable it was decided that the seal herd, with the possible exception of a few stragglers, had passed west of the *Unalga's* cruising ground. Therefore, on May 25, the patrol was discontinued and the cutter left Sitka for Juneau. During these cruises all fishing vessels fallen in

with were boarded and examined, but no infractions of law were found. The fishermen were closely questioned as to illegal killing of seals, but no evidence in this regard was obtained. Government and Territorial officials, residents, and natives of the towns visited were interviewed for the purpose of verifying rumors of illegal killing of seals, both by natives and by fishermen, but no one advanced any information with regard to these supposed violations of law. Very few fishing vessels were found on the fishing banks. It was reported, however, that, owing to a poor market for fish, an unusually small number of vessels were engaged in fishing operations during the spring. So far as could be determined no sea otters have been seen in the waters of southeast Alaska for a number of years.

Snohomish.—The *Snohomish* maintained an active patrol of the waters between the Columbia River and Dixon Entrance for the protection of the seal herd during its migration northward. The cutter left Port Angeles, Wash., on April 8, 1922, and arrived at Astoria, Oreg., on April 9. On the following day began the patrol off the Columbia River entrance. From that date until June 1 the *Snohomish* maintained a continuous patrol of the waters named. The patrol was not discontinued, however, until it was ascertained beyond doubt that the seal herd had passed the section of the coast which the *Snohomish* was assigned to patrol. While engaged in the patrol duties the commanding officer of the cutter interviewed various persons with regard to sealing along the coasts of British Columbia and Washington. Among those consulted were the Indian agent, the Weather Bureau observer, and the general storekeeper, all of Neah Bay, the Indian agent and school-teacher at Quillayute, Wash., various Indians engaged in sealing off the coast of Washington, the collector of customs at Port Alberni, British Columbia, the commanding officer of the Canadian fisheries steamer *Thiepval*, and various fishermen. It appears that the Quillayute Indians of Quillayute, Wash., and the Makah Indians of Neah Bay, Wash., are the only tribes that engage in sealing along the Washington coast. Both of the above-mentioned villages were visited and investigations conducted. The Makah Indians seal from Ozette, which is more advantageously located to the sealing grounds than Neah Bay. It was ascertained that only two Indians remain of the Ozette tribe. During the current season 18 canoes were sealing out of Quillayute and 10 out of Ozette. When the weather is favorable the natives leave their villages about 3 a. m., paddle out to sea for a distance of 20 to 30 miles, hunt for four or five hours, and return to their villages by dark. From 10 to 12 hours each day is spent going to and from the sealing ground. The commanding officer of the *Snohomish* reports that, owing to the treacherous waters in the vicinity of Cape Flattery, canoes are caught frequently offshore in a gale, and being unable to land through the surf the sealers' lives are thus endangered. The commanding officer heartily concurs in the recommendation made not long ago by an official of the Indian Service, namely, that the Indians be permitted to take seals with firearms from motor boats, and that their total catch be limited. It appears that the natives are very jealous of their exclusive prerogative of taking sealskins and are quick to report any vessels that they suspect are conducting illegal sealing operations. No evidence has been found that persons other than Indians are engaged in sealing or that the Indians are employing illegal methods in killing the animals. The commanding officer of the Canadian fisheries steamer *Thiepval* reports that the bulk of the seal herd passed the British Columbia coast during the first two weeks of May. He also reports that the only sealing operations conducted along the British Columbia coast is between Clayoquot Sound and Kyuquot Sound, such operations being carried on by the natives in that locality, and that very little sealing has been done this year, as the Indians can obtain better pecuniary returns by fishing. He further states, however, that he has no evidence to substantiate the belief that seals are being taken illegally.

Summary.—In summarizing the season's operations the Bering Sea patrol commander reports that a number of trips were made over the fishing banks in the southeastern part of Bering Sea (Slime and Baird Banks), also Bowers and Petrel Banks, in the southern part of Bering Sea, and over Portlock, Albatross, Sanak, and Davidson Banks, in the North Pacific Ocean, for the purpose of determining whether vessels engaged in fishing were operating in accordance with the terms of the convention for the preservation and protection of fur seals; also for the purpose of rendering medical aid and other assistance to the fishing vessels. While on these cruises mail received from the

postmaster at Unalaska was delivered to the fleet of fishing vessels. In a number of cases medical assistance was afforded to the fishermen. One man in need of hospital treatment was transported to Unalaska and transferred to the Jesse Lee Home, which institution maintains a hospital for the treatment of sick seamen and others. All assistance possible was given to the fishing fleet without neglecting other important duties required of the patrol force. During the cruises of the several cutters all vessels fallen in with were boarded and examined, but no evidence was found of illegal sealing. The patrol vessels at all times cooperated with the Government agents on the Pribilof Islands while cruising in the vicinity. In April mail, supplies, and passengers were transported from Seattle, Wash., to St. Paul Island and St. George Island. During the season mail and supplies for the islands were delivered as promptly as possible after each arrival of the mail steamer at Unalaska. On request of the agent of St. Paul Island transportation between St. Paul Island and St. George Island and between Unalaska and the islands was afforded to various officials, working parties, and natives. All villages on the Aleutian Islands were visited several times during the season and conditions investigated, vital statistics recorded, and medical assistance afforded to the sick. Aside from various other duties performed by the cutters assigned to patrol duty in Alaskan waters, there were transported for other departments of the Government 163 tons of freight, consisting of general merchandise, lumber, provisions, oil, gasoline, etc. During the cruise of the various cutters 38,729 miles were covered and 143 vessels boarded.

SEALING PRIVILEGES ACCORDED ABORIGINES.

Early in the year the form of certificate used in authenticating sealskins lawfully taken by Indians dwelling on the Pacific coast of the United States was revised. A certificate in triplicate is prepared for each skin by the officer authenticating the same, the original going to the owner of the skin, one copy to the office of the Bureau of Fisheries at Seattle, Wash., and one copy to the Washington (D. C.) office. When authenticated skins are shipped the original certificates must accompany them, and when the skins arrive at a port of entry the customs authorities will forward the original to the bureau's Seattle office, which will advise in regard to the legality of the shipment and forward copies of the certificates to the consignee. When the skins are dressed and dyed, the company doing the work shall indorse the owner's copy of each certificate to show the date and by whom each skin was dressed and dyed and shall then send them to the owner of the skin. The dresser and dyer will, before returning any skin to the owner, plainly and indelibly stamp it as follows: "U. S. Authenticated Certificate No. —", and the trade-mark or name of the dresser and dyer. Provision is made on the certificates for recording transfers in ownership of the skin. When the skins are authenticated, a numbered leather tag is attached to each skin, the number on the tag corresponding to that placed on the certificate. The tag will be removed by the dresser and dyer and forwarded to the Commissioner of Fisheries, Washington, D. C., together with the name and address of the person from whom the skin was received.

A total of 1,633 fur-seal skins was authenticated as having been lawfully taken in 1922 by Indians in the waters off the coasts of Washington and of southeast Alaska. Of the 1,633 skins 1,107 were taken during May and June by the Indians of Washington and were authenticated by A. D. Dodge, superintendent, United States Indian School, Neah Bay, Wash. Of these 641 were reported as having been taken from male seals and 462 from females. The sex of the remaining 4 seals from which skins were taken was not reported.

The rest of the 1,633 skins, 526 in number, were taken in the vicinity of Sitka, Alaska, mostly, if not entirely, by Indians who resided in that general locality. Of these 409 were reported as having been taken from male seals and 116 from females, while the sex of one was not determined. The earliest reported take was April 26 and the latest June 3.

JAPANESE SEALSKINS DELIVERED TO THE UNITED STATES.

The United States Government's share of the sealskins taken on Robben Island in 1920 was 56. These were received at St. Louis April 26, 1921, and after having been dressed, dyed, and machined were sold April 3, 1922. They brought $1,276, an average of $22.79 each.

The United States Government's share of the sealskins taken on Robben Island in 1921 was 55 skins and in 1922, 60 skins. These were shipped to St. Louis to be dressed, dyed, and machined and sold for the account of the United States. The 55 skins of the 1921 take were received at St. Louis in the latter part of October, 1922, the 60 of the 1922 take in February, 1923.

FUR-SEAL CENSUS, PRIBILOF ISLANDS, 1922.

By Edward C. Johnston.

The annual census of the fur-seal herd resorting to the Pribilof Islands in 1922 was taken at the height of the season. The harem count was made on St. Paul Island first; the count of pups on St. George Island first. Only one round trip between the islands was necessary. The pups were counted on all rookeries on both islands for the first time since 1916.

J. M. Orchard, school-teacher on St. George Island, assisted in the pup count on both islands. H. A. Peterson, sealing assistant on St. Paul Island, aided in the pup count at Northeast Point on St. Paul Island. The superintendent and the agents of both islands cooperated in providing assistance for the erection of the counting towers and in assigning to the census work the most intelligent natives. On St. Paul Island all but one of the native assistants were taken from the temporary employees, both because of their better understanding of English and their willingness, due to comparative ignorance of seal life, to obey orders. The fisheries vessel *Eider* furnished transportation between St. Paul and St. George Islands.

In 1917 the rookery areas were plotted upon the series of rookery charts. In 1922, in conjunction with the harem count, the rookery areas were again charted. A new series of photographs of the rookeries was made also, using the same stations as in 1917.

In addition to the two counting towers already in position on Reef rookery nine new ones were erected in the spring of 1922—two on Little Zapadni rookery, three on Zapadni rookery, and three on Vostochni rookery, all on St. Paul Island, and one on Staraya Artil rookery on St. George Island. Wooden markers were placed on various rookeries where they would be of service in the harem count. Construction of the towers and the placing of the markers were completed before the seals arrived.

PUPS.

Since 1916, when the last complete pup count was made, the total number of pups and of cows (by inference) had been estimated from actual counts made upon a few rookeries only. Due to the great yearly variation in the number of seals present on any one rookery, it would be possible for the herd, as a whole, to increase, while the number of seals upon the rookeries where pups were counted decreased. The estimate of pups on the uncounted rookeries had been based partly upon the average harem of all counted rookeries and partly upon field observations extending over a number of years.

In order to check the accuracy of these estimates since 1916, it was considered advisable to make another complete pup count, and, because of the increasing size of the seal herd, further delay would have been disadvantageous.

The pup count began on St. George Island on July 26, four days earlier than in 1921. There was no difficulty from the harem bulls, as the large average harem made it safe to go over the rookeries at such an early date. The count was completed on August 7 on St. Paul Island. Although the harems were not counted on Sivutch rookery, it was possible to make the pup count there. The results were more than satisfactory in every way.

Up to July 15 the weather on St. Paul Island was the driest that had occurred in recent years. Had the dryness continued through the pup count the fatalities due to suffocation would have been extremely large. It was, indeed, fortunate that only six pups were killed as a result of the counting. To balance this loss there were rescued from crevices and holes during the count 11 cows and about twice that number of pups, all of which would have died had they not been discovered and released. Six albino pups were noticed during the count.

Of the total of 185,914 pups in the seal herd in 1922, 95 per cent were actually counted. The remaining 5 per cent were necessarily estimated. On some of the rookeries there are areas made up of large bowlders under which the pups when they are disturbed pack themselves as closely as their strength allows. If the hole is a small one, they can be pulled out and counted, but otherwise there is no way to determine their number accurately. On one rookery on St. Paul Island a section was found with round rocks 2 to 3 feet in diameter. The holes between these rocks were 2 to 4 feet deep and pups falling into them were unable to climb out. To have counted the pups over this section would have caused many of them to fall into the holes where they would have starved to death. During the latter part of the count small groups of pups were on the edge of the water and it was impossible to make a perfect count of them. The number of pups thus estimated, however, was less than 10,000, conservatively figured.

C. E. Crompton reports, in the St. George Island journal, under date of November 3, 1921, the occurrence of the birth of a seal pup in the month of October. As practically all seal pups are born before August 7 such a late birth is remarkable. The journal entry follows:

* * * During the work on the rookeries to-day a very young pup was noticed. The age of this pup was estimated at from 2 to 3 weeks and the writer feels certain that it was not more than 3 weeks of age at the most. It is to be regretted that this birth was not observed, as it is probably the latest one on record. The pup seen to-day could not yet swim and will most certainly have difficulty following the migrating seals in their journey south at the end of this month * * *.

Distribution of pups on Pribilof Islands in 1922 and comparison with distribution in 1921.

Rookery.	1922					1921	1922	
	Date of count.	Living pups.	Dead pups.	Total pups.	Per cent dead pups.	Total pups.	Increase (+) or decrease (−).	Per cent increase (+) or decrease (−).
St. Paul Island:								
Kitovi	Aug. 4	5,847	87	5,934	1.47	4,353	+1,581	+36.32
Lukanin	do	3,467	77	3,544	2.17	2,938	+606	+20.63
Gorbatch	Aug. 2	13,996	121	14,117	.86	10,909	+3,208	+29.41
Ardiguen	do	980	24	1,004	2.39	1,088	−84	−7.72
Reef	do	25,080	372	25,452	1.46	24,638	+814	+3.30
Sivutch	Aug. 4	7,962	199	8,161	2.44	8,854	−693	−7.83
Lagoon	Aug. 5	272	1	273	.37	287	−14	−4.88
Tolstoi	do	19,226	271	19,497	1.39	15,708	+3,789	+24.12
Zapadni	Aug. 3	15,823	277	16,100	1.72	16,830	−730	−4.34
Little Zapadni	do	8,625	221	8,846	2.50	10,037	−1,191	−11.87
Zapadni Reef	do	493	4	497	.80	502	−5	−1.00
Polovina	Aug. 5	8,636	134	8,770	1.53	6,071	+2,699	+44.46
Polovina Cliffs	do	3,876	73	3,949	1.85	2,785	+1,164	+41.80
Little Polovina	do	1,478	38	1,516	2.51	1,676	−160	−9.55
Morjovi	Aug. 6	3,839	79	3,918	2.02	2,994	+924	+30.86
Vostochni	Aug. 6-7	36,531	777	37,308	2.08	40,195	−2,887	−7.18
Total		156,131	2,755	158,886	1.73	149,865	+9,021	+6.02
St. George Island:								
North	July 26	10,219	145	10,364	1.40	9,986	+378	+3.79
Staraya Artil	July 28	6,874	182	7,056	2.58	6,620	+436	+6.59
Zapadni	July 27	885	10	895	1.12	895		
South	do	228	4	232	1.72	187	+45	+24.06
East Reef	July 29	2,344	36	2,380	1.51	2,628	−248	−9.44
East Cliffs	July 30	6,010	91	6,101	1.49	6,474	−373	−5.76
Total		26,560	468	27,028	1.73	26,790	+238	+.89
Total (both islands)		182,691	3,223	185,914	1.73	176,655	+9,259	+5.24

The results of the complete pup count show conclusively that the estimates of pups made annually since 1916 have been, in general, correct. In fact, the largest differences between the percentage of increase in 1921 and that in 1922 are found on the rookeries that have been counted both years. Polovina and Polovina Cliffs rookeries, counted in 1920 and 1921, showed a percentage of increase of 1.08 and 8.24, respectively, in 1921. In 1922 the increase was 44.46 per cent for Polovina and 41.8 per cent for Polovina Cliffs. Reef rookery, next to Vostochni the largest rookery on the islands, was estimated in 1920 to have increased 5.26 per cent and in 1921 to have increased 4.23 per cent. The count of 1922 showed an increase of 3.3 per cent. The estimate of pups on Vostochni rookery in 1921 showed an increase of 22.33 per cent, but the count in 1922 showed a decline of 7.18 per cent. It may be that the 1921 figure was too high, but the difference between the 1921 and 1922 figures for this rookery is less than the difference between those for Polovina (counted in both years), proving that it is possible for Vostochni to vary as the figures show.

Since the variation in the annual rate of increase on one rookery and the variation in the increase of the different rookeries in the same year are so great, a constant rate of increase can not be given for any one rookery nor can the same rate of increase be applied

to every rookery. The figure must be based largely upon yearly observations of rookery life.

The number of pups on St. George Island in 1922 is but little more than was estimated in 1921, the increase being 0.89 per cent. In 1921 the per cent gain was estimated to be 10.47, which was probably a little high. The total count of 1922 for both islands showed an increase of 5.24 per cent over the estimated figures of 1921.

That the number of dead pups on the rookeries was small was noticed early. In 1921 the percentage of dead pups was estimated to be 2.48 for both islands. In 1922 it dropped to 1.73, derived from actual counts. It is not believed that the 1921 figure was too high. From the top of the counting tower near rock 17 on Reef rookery in 1921 there were counted 22 dead pups just before the census of harems was taken. In 1922 at approximately the same time only 8 dead pups could be seen from the same tower. Of the 22 rookeries on both islands 9 show small increases and 13 show decreases in the percentage of dead pups. On Zapadni Reef rookery, St. Paul Island, the percentage of dead dropped from 3.19 (actual count) to 0.8 (actual count). On Gorbatch rookery it dropped from an estimated percentage of 2.74 to an actual percentage of 0.86. It is believed that the absence of rain and the constant temperature during June and the greater part of July tended to reduce the death rate of pups on the rookeries. The increase in the average harem also tended to decrease the percentage of dead pups.

COWS.

The table showing the distribution of pups will show the number of cows on the various rookeries, since the number of breeding cows is the same as the number of pups. The various percentages of increase or decrease of total pups will also apply to the cows. In all 90 dead cows were found during the pup count. This is a decrease of 29 from the number estimated in 1921. It is a little less than 0.05 of 1 per cent of the total number.

BRANDED SEALS.

Cows that as pups were branded with a single bar across the back between the years 1900 and 1903 continue to reappear on the rookeries of St. George Island. Four animals of this series were observed and each was raising a pup. These animals were at least 19 years old. When it is understood that seals born in 1903 passed through eight years of pelagic sealing, the continued presence of these cows is all the more remarkable.

Several cows bearing the 1912 brand appeared on St. George Island, and probably some were present on St. Paul, although none was observed there. Four bulls branded as pups in 1912 with the T-brand on the top of the head were also seen on St. George Island, each in charge of a harem.

HAREM AND IDLE BULLS.

The count of harem and idle bulls was made on St. Paul Island from July 16 to 20 and on St. George Island from July 22 to 23. The harems had begun to break up before the count was entirely

finished and the harem masters had begun to leave their positions for the hauling grounds to rest and recuperate. As long as the average harem remains large there will be an early loss of harem formation with the consequent influx of idle bulls. In the future the counting dates on St. George Island should be the same as on St. Paul (July 16 to 20), or if there is no one on St. George available to make the count the census should start on St. Paul July 14 instead of 16, as at present. For the second successive season inclement weather has prevented a harem count on Sivutch rookery.

Harem and idle bulls and percentage of idle bulls to harem bulls compared to average harem, Pribilof Islands, 1922.

Rookery.	Date.	Harem bulls.	Idle bulls.	Total bulls.	Per cent idle to harem bulls.	Average harem.
St. Paul Island:						
Kitovi	July 20	158	10	168	6.33	37.56
Lukanin	do	96	12	108	12.50	36.92
Gorbatch	July 16	219	13	232	5.94	64.46
Ardiguen	do	24	3	27	12.50	41.83
Reef	do	425	40	465	9.41	59.89
Sivutch		[1] 171	[1] 27	[1] 198	15.79	47.73
Lagoon	July 20	8		8		34.13
Tolstoi	July 19	365	22	387	6.03	53.42
Zapadni	July 16	306	30	336	9.80	52.61
Little Zapadni	do	169	29	198	17.16	52.34
Zapadni Reef	do	17		17		29.24
Polovina	July 17	174	52	226	29.89	50.40
Polovina Cliffs	do	103	19	122	18.45	38.34
Little Polovina	do	43	17	60	39.53	35.26
Morjovi	July 18	103	50	153	48.54	38.04
Vostochni	do	803	169	972	21.05	46.46
Total		3,184	493	3,677	15.48	49.90
St. George Island:						
North	July 22	132	2	134	1.52	78.52
Staraya Artil	July 23	83	5	88	6.02	85.01
Zapadni	do	21		21		42.62
South	do	4	5	9	125.00	58.00
East Reef	July 22	49	2	51	4.08	48.57
East Cliffs	do	89	1	90	1.12	68.55
Total		378	15	393	3.97	71.50
Total (both islands)		3,562	508	4,070	14.26	52.19

[1] Weather had prevented a count of bulls on this rookery since 1920, when the number was 190. Applying the average decrease of harem bulls on all other rookeries on St. Paul Island (10 per cent) there should have been approximately 171 harem bulls in 1922. In the same manner the number of idle bulls is estimated to have been 27.

AVERAGE HAREM.

The average harem is computed by dividing the number of cows (females 3 years of age or over) by the number of harem bulls. The number of cows is obtained from the pup count, there being one cow for each pup.

The following table shows the average harem in 1922 for each rookery, for each island, and for the herd as a whole. For convenience the numbers of cows and harem bulls are also shown. The average harem on St. Paul Island increased from 43.53 in 1921 to 49.90 in 1922, on St. George Island from 57.49 in 1921 to 71.50 in 1922, and for the entire herd from 45.19 in 1921 to 52.19 in 1922.

Average harem in 1922 for all fur-seal rookeries on Pribilof Islands.

Rookery.	Breeding cows.	Harem bulls.	Average harem.	Rookery.	Breeding cows.	Harem bulls.	Average harem.
St. Paul Island:				St. Paul Island—Con.			
Kitovi	5,934	158	37.56	Vostochni	37,308	803	46.46
Lukanin	3,544	96	36.92				
Gorbatch	14,117	219	64.46	Total	158,886	3,184	49.90
Ardiguen	1,004	24	41.83				
Reef	25,452	425	59.89	St. George Island:			
Sivutch	8,161	171	47.73	North	10,364	132	78.52
Lagoon	273	8	34.13	Staraya Artil	7,056	83	85.01
Tolstoi	19,497	365	53.42	Zapadni	895	21	42.62
Zapadni	16,100	306	52.61	South	232	4	58.00
Little Zapadni	8,846	169	52.34	East Reef	2,380	49	48.57
Zapadni Reef	497	17	29.24	East Cliffs	6,101	89	68.55
Polovina	8,770	174	50.40				
Polovina Cliffs	3,949	103	38.34	Total	27,028	378	71.50
Little Polovina	1,516	43	35.26				
Morjovi	3,918	103	38.04	Total (both islands)	185,914	3,562	52.19

ANNUAL INCREASE OF THE FUR-SEAL HERD.

The increase in the total number of seals in 1922 over 1921 was 23,519, or 4.04 per cent, as compared with an increase of 28,725, or 5.2 per cent, in 1921 over 1920.

The minimum reserve of 5,000 three-year-old males for breeding purposes as required by law will be wholly inadequate in the future for the proper upbuilding of the fur-seal herd. Not less than 10,000 seals of this class must be reserved annually in order to provide sufficient male strength.

COMPLETE CENSUS.

The figures given below are as nearly correct as it has been possible to make them. They are based upon a complete pup count on all rookeries, a harem count in which 11 elevated counting stations were used, and a close approximation of the numbers of those classes of seals that can not be counted. The seal herd shows a satisfactory growth, although the decrease in number of breeding bulls and the increase of average harem should be corrected as soon as possible. This can be done, of course, by reserving a large number of 3-year-old males.

Details of census of fur seals, Pribilof Islands, as of August 10, 1922.

	St. Paul.	St. George.
Pups, counted	158,886	27,028
Breeding cows, 3 years and over, by inference	158,886	27,028
Harem bulls, counted	3,184	378
Idle bulls, counted	493	15
Yearlings, male and female, estimated:		
Females born in 1921	74,933	13,395
Natural mortality, 35 per cent	26,227	4,688
Yearling females, Aug. 10, 1922	48,706	8,707
Males born in 1921	74,932	13,395
Natural mortality, 40 per cent	29,973	5,358
Yearling males beginning 1922	44,959	8,037
Yearling males killed 1922	8	.....
Yearling males Aug. 10, 1922	44,951	8,037
2-year-olds, male and female, estimated:		
Yearling females, Aug. 10, 1921	46,565	7,882
Natural mortality, 15 per cent	6,985	1,182
2-year-old females, Aug. 10, 1922	39,580	6,700
Yearling males, Aug. 10, 1921	42,973	7,276
Natural mortality, 17½ per cent	7,520	1,273
2-year-old males beginning 1922	35,453	6,003
2-year-old males killed 1922	510	26
2-year-old males, Aug. 10, 1922	34,943	5,977
3-year-old males, estimated:		
2-year-old males, Aug. 10, 1921	35,678	6,215
2-year-old males killed fall 1921	38	13
2-year-old males end of 1921	35,640	6,202
Natural mortality, 12½ per cent	4,455	775
3-year-old males beginning 1922	31,185	5,427
3-year-old males killed 1922	24,398	4,755
3-year-old males, Aug. 10, 1922	6,787	672
4-year-old males, estimated:		
3-year-old males, Aug. 10, 1921	13,301	1,367
3-year-old males killed fall 1921	672	365
3-year-old males end of 1921	12,629	1,002
Natural mortality, 10 per cent	1,263	100
4-year-old males beginning 1922	11,366	902
4-year-old males killed 1922	416	45
4-year-old males, Aug. 10, 1922	10,950	857
5-year-old males, estimated:		
4-year-old males, Aug. 10, 1921	6,405	375
4-year-old males killed fall 1921	2	13

	St. Paul.	St. George.
5-year-old males, estimated—Continued.		
4-year-old males end of 1921	6,403	362
Natural mortality, 10 per cent	640	36
5-year-old males beginning 1922	5,763	326
5-year-old males killed 1922	8	1
5-year-old males, Aug. 10, 1922	5,755	325
6-year-old males, estimated:		
5-year-old males, Aug. 10, 1921	3,841	888
5-year-old males killed fall 1921	.....	10
5-year-old males end of 1921	3,841	878
Natural mortality, 20 per cent	768	176
6-year-old males beginning 1922	3,073	702
6-year-old males killed 1922	4	.....
6-year-old males, Aug. 10, 1922	3,069	702
Surplus bulls, 7 years and over, estimated:		
6-year-old males, Aug. 10, 1921	3,895	96
6-year-old males killed fall 1921	.....	.....
6-year-old males end of 1921	3,895	96
Natural mortality, 20 per cent	779	19
7-year-old males beginning 1922	3,116	77
Surplus bulls, Aug. 10, 1921	2,921	380
Surplus bulls killed fall 1921	.....	.....
Surplus bulls end of 1921	2,921	380
Natural mortality, 30 per cent	876	114
Remaining surplus for 1922	2,045	266
Breeding bulls of 1921	4,154	502
Natural mortality, 30 per cent	1,246	151
1921 bulls remaining 1922	2,908	351
Breeding bulls of 1922	3,677	393
1921 bulls remaining, deducted	2,908	351
Increment new bulls 1922	769	42
7-year-old males computed for 1922	3,116	77
Surplus bulls computed for 1922	2,045	266
Total theoretical surplus bull stock for 1922	5,161	343
7-year-old males killed in 1922	.....	1
Total surplus in 1922	5,161	342
New increment breeding bulls deducted	769	42
Surplus bulls in 1922	4,392	300
50 per cent deducted for losses due to fighting, natural causes, and errors in loss percentage in previous years	2,196	150
Surplus bulls, Aug. 10, 1922	2,196	150

RECAPITULATION.

	St. Paul.	St. George.	Both islands.
Pups	158,886	27,028	185,914
Cows	158,886	27,028	185,914
Harem bulls	3,184	378	3,562
Idle bulls	493	15	508
Yearling females	48,706	8,707	57,413
Yearling males	44,951	8,037	52,988
2-year-old females	39,580	6,700	46,280
2-year-old males	34,943	5,977	40,920
3-year-old males	6,787	672	7,459
4-year-old males	10,950	857	11,807
5-year-old males	5,755	325	6,080
6-year-old males	3,069	702	3,771
Surplus bulls (7 years and over)	2,196	150	2,346
Total, 1922	518,386	86,576	604,962
Total, 1921			581,443
Numerical increase, 1922			23,519
Per cent increase, 1922			4.04